REPORT RESUMES

ED 017 679 VT 003 959

SYMPOSIUM ON FORECASTING OF MANPOWER REQUIREMENTS.
(WASHINGTON, D.C., JUNE 23-25, 1966).
MANPOWER ADMINISTRATION (DOL), WASHINGTON, D.C.
PUB DATE 66
EDRS PRICE MF-$0.50 HC-$3.96 97P.

DESCRIPTORS- *MANPOWER DEVELOPMENT, MANPOWER UTILIZATION, LABOR FORCE, OCCUPATIONS, INDUSTRY, *EMPLOYMENT PROJECTIONS, *EDUCATIONAL PLANNING, EDUCATIONAL NEEDS, *DEVELOPING NATIONS, ECONOMIC DEVELOPMENT, OCCUPATIONAL SURVEYS, SOCIAL DEVELOPMENT, SYMPOSIA, SPEECHES, UNEMPLOYMENT,

FORTY-TWO SCHOLARS, EXPERTS, AND TECHNICIANS WHO HAVE BEEN INVOLVED IN THE CONDUCT OF MANPOWER FORECASTING PROGRAMS MET TO EXCHANGE AND SYNTHESIZE IDEAS ABOUT FORECASTING MANPOWER REQUIREMENTS IN DEVELOPING COUNTRIES. PAPERS PRESENTED WERE--(1) "THE INDUSTRY-OCCUPATIONAL MATRIX APPROACH" BY HAROLD GOLDSTEIN, (2) "INTERNATIONAL COMPARISONS OF INDUSTRY-OCCUPATIONAL STRUCTURE" BY MORRIS A. HOROWITZ, (3) "A SYSTEMS ANALYSIS APPROACH TO HUMAN RESOURCE DEVELOPMENT PLANNING" BY FREDERICK HARBISON, (4) "FORECASTING EDUCATIONAL NEEDS FOR ECONOMIC AND SOCIAL DEVELOPMENT" BY HERBERT PARNES, (5) "THE MANPOWER SKILL SURVEY AND LABOR AREA DEMAND ANALYSIS" BY VLADIMIR D. CHAVRID, AND (6) "COMMENTARIES ON THE APPLICATION OF FORECASTING TECHNIQUES TO DEVELOPING COUNTRIES" BY JOSHUA LEVINE AND OTHERS. E.C. MCVOY, IN SUMMARIZING THE PROCEEDINGS, CONCLUDED THAT APPROACHES TO FORECASTING, PROJECTING, OR ESTIMATING MANPOWER REQUIREMENTS VARY ACCORDING TO THE PURPOSE, THE DEGREE OF ECONOMIC PLANNING, THE AVAILABILITY AND RELIABILITY OF DATA, AND OTHER FACTORS. THERE IS NO ONE SUPERIOR TECHNIQUE FOR SUCH FORECASTING FOR DEVELOPING COUNTRIES, BUT RATHER, ONE OR MORE OF SEVERAL COMPLEMENTARY APPROACHES SUCH AS LONG RANGE PROJECTIONS, INTERNATIONAL COMPARISON OF INDUSTRY-OCCUPATIONAL STRUCTURE, AND AREA SKILL SURVEY OF LABOR AREA DEMAND ANALYSIS COULD BE APPLIED. DISCUSSIONS OF THE SPEECHES ARE INCLUDED. (ET)

ED017679

INTERNATIONAL MANPOWER INSTITUTE

SYMPOSIUM on FORECASTING of MANPOWER REQUIREMENTS

JUNE 23-25, 1966 WASHINGTON, D.C.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

SYMPOSIUM ON FORECASTING OF MANPOWER REQUIREMENTS

June 23-25, 1966

Washington, D. C.

Conducted by:

THE INTERNATIONAL MANPOWER INSTITUTE

Under sponsorship of
Agency for International Development
Department of Labor

With the participation of The Ford Foundation

CONTENTS

Introduction.. i

Part I... 1
THE INDUSTRY-OCCUPATIONAL MATRIX APPROACH
  Harold Goldstein
  Discussants: Sol Swerdloff and Jack Alterman

Part II...11
INTERNATIONAL COMPARISONS OF INDUSTRY-OCCUPATIONAL STRUCTURE
  Morris A. Horowitz
  Discussants: Manuel Zymelman and Irwin L. Herrnstadt

Part III..23
A SYSTEMS ANALYSIS APPROACH TO HUMAN RESOURCE DEVELOPMENT PLANNING
  Frederick Harbison

Part IV...46
PANEL DISCUSSION
  Frederick Harbison, Chairman
  Russell Davis
  Harold Goldstein
  Morris Horowitz

Part V..54
FORECASTING EDUCATIONAL NEEDS FOR ECONOMIC AND SOCIAL DEVELOPMENT
  Herbert Parnes
  Discussant: Robinson Hollister

Part VI...64
THE MANPOWER SKILL SURVEY AND LABOR AREA DEMAND ANALYSIS
  Vladimir D. Chavrid
  Discussant: Fletcher Wellemeyer

Part VII..78
COMMENTARIES ON THE APPLICATION OF FORECASTING TECHNIQUES TO DEVELOPING COUNTRIES
  Joshua M. Levine, **Burnie Merson, Robert L. Clark, Meredith Givens**

Summary and Conclusions...83
  Edgar C. McVoy

Symposium Leaders, Discussants, and Chairmen....................................86

Participants..89

INTRODUCTION

The Symposium on Forecasting of Manpower Requirements was conducted in Washington, D. C., by the International Manpower Institute on June 23 and 24, 1966, at the Brookings Institution. It was sponsored by the Agency for International Development and the Labor Department with the participation of the Ford Foundation.

The purpose of the Symposium was to bring together scholars, experts, and technicians who have led in the development of various methods for forecasting manpower requirements or who have been professionally involved in the conduct of manpower forecasting programs. The Symposium provided a structured situation in which these persons could pool their knowledge of techniques and resources for projecting manpower needs. It also afforded them an opportunity to examine and evaluate several of the more pertinent current techniques, exploring their suitability for use in developing countries.

In addition, it was intended that the Symposium would stimulate more collaboration among practitioners of the various forecasting methods and procedures, provide the basis for development of more instructional media for manpower specialists advising less-developed countries, and enrich the materials available on manpower forecasting for use in international seminars and similar training courses for foreign manpower officers.

The major portion of the Symposium was devoted to the presentation and discussion of techniques and systems for manpower requirements forecasting by their leading exponents. The last segment of the program consisted of a panel of persons experienced in manpower aspects of economic and social development. Their comments and ensuing discussions were designed to explore and evaluate the concepts presented with special regard to their application to emerging or developing countries.

The planning committee of the Symposium was composed of the following persons: Arnold L. Zempel, Burnie Merson, Ealton L. Nelson, and Joshua M. Levine from the Agency for International Development; Harry Weiss, John P. Walsh, James F. Taylor, and Edgar C. McVoy from the Department of Labor; and John F. Hilliard from the Ford Foundation.

The following served as chairmen of the several sessions: John P. Walsh, Frederick H. Harbison, John F. Hilliard, and Ealton L. Nelson. The Secretariat of the Symposium were: Edgar C. McVoy, Acting Director, International Manpower Institute; Raphael Brown, Administrative Officer; Juanita D. Coates, Administrative Assistant; and Dudley D. Davis, Allan Broehl, and Joseph Humphrey, who prepared the report of the proceedings.

Part I: THE INDUSTRY-OCCUPATIONAL MATRIX APPROACH

Harold Goldstein

Discussants: Sol Swerdloff and Jack Alterman

Methodology Has Many Facets

Although referred to as "The Industry-Occupational Matrix Approach" for the sake of brevity the method followed by the Bureau of Labor Statistics in projecting manpower requirements encompasses many different methods or schools of thought. In general, it is an analytical approach and it is eclectic--a composite of different methods--aimed at gaining insight into manpower requirements. This research, which we have carried on for two decades, serves as the basis for the Occupational Outlook Handbook--which has been published almost every two years since 1949--and other studies of the Bureau of Labor Statistics, the most recent of which is a study prepared for the National Commission on Technology, Automation, and Economic Progress, "America's Industrial and Occupational Manpower Requirements 1964-1975." The methods are based therefore on some experience over a number of years and have had the benefit of constant improvement. The industry-occupational matrix serves as an approach for projecting both manpower requirements and supply.

Manpower Supply Also Considered

I add "supply", even though the title of this program is limited to manpower requirements, because I feel that it is necessary to consider both requirements and supply in order to take account of the constraints of supply which, in turn, affect requirements. Without consideration of supply, requirements may exceed the available resources that can be reasonably anticipated. Among other things, the purpose of forecasting manpower requirements is to anticipate training needs. If this were a perfect world we could project these requirements and, subsequently, train the exact number of people required to fill the gaps. In this model, training is the unknown in the equation to be solved. However, in the real world, we cannot count on being able to train all the workers needed--there are constraints. Under these circumstances the requirements, as initially projected on the basis of past relationships, must be reviewed in the light of possible shortages of supply and the substitution effect. We may then come out with a second set of requirements which are modified to take into account constraints as employers adjust to supply limitations.

In this presentation, I am assuming that the projection of manpower requirements represents only a small part of the total job of manpower planning; essentially, it is an attempt to get numbers. As I read the summary of

Dr. Harbison's presentation to be made later, in which he talks about "systems analysis"--a broad approach to the development of manpower policies and the analysis of manpower problems in developing countries--I see our topic as a very small part of this total systems analysis.

Occupational Demand Directly Related to an Independent Factor

In general, what I have called an analytical approach rests on the rather trite and obvious notion that a determination of future demand for workers in an occupation can be made by analyzing the factors that affect demand for that occupation and the economic variables which are associated with these factors, as indicated by past data. Then, it is necessary to project these variables and, from the relationship that has been established and any changes that are observed or any systematic trends which influence these relationships, to project from the governing or independent variables the demand for the occupation.

A simple case is illustrated by the demand for teachers where the trends in the ratio of teachers to pupils are examined at different educational levels, and a study is made of what has affected this ratio over time. Independent projections of the population of school age are made, and the demand for teachers can be determined by applying the forecast student-teacher ratios to these projections. One must allow for all factors which may enter into the changing ratio of teachers to pupils. Other occupations may be approached in a similar manner. The demand for auto mechanics, for example, may be projected on the basis of the number of automobiles and trucks that may be in use at the forecast date.

Occupational Demand Dependent on Various Factors

This simple approach can be applied to many occupations and industries. It is difficult to employ, however, with occupations found in a wide number of industries, i.e., engineers, machinists, stenographers, and a host of other occupations. In these cases where the relationship between a single independent variable and the specific occupation is not so close, a more complex analysis is necessary. Typically, what has been done in the United States and in other countries follows a similar pattern which I will summarize in six steps. This, of course, is an oversimplification justified by the limited time available.

Gross National Product is Estimated

First, the total level of economic activity, or gross national product, must be projected. This can be done either by projecting past rates of growth in GNP or by projecting the size of the population and the labor force. This projection of the labor force is further divided into an assumed level of employment and unemployment. Employment is then converted to GNP by making assumptions as to the rate of productivity growth and changes in the average number of hours worked per worker per year.

Second, from this projected aggregate level of economic activity, assumptions are then made as to the composition of the GNP in broad terms, i.e., consumer demand, investment, and government expenditures. It may be useful to make a variety of assumptions as to the composition of GNP in order to explore the manpower implications of different policies which may be followed.

Product Demand is Estimated

As a third step, estimates of demand are made for each product associated with the composition and general character of projected economic activity. What will be the demand for automobiles, for example, or for food, consistent with this general pattern? This may be done by a regression analysis of demand for each product against the total or against some of the principal components such as consumer or investment expenditures. Or, these estimates may be made by a more elaborate analysis of the patterns of consumption for each product based on family expenditure studies coupled with projections of the number of families at different income levels.

Industry Demand is Estimated

Fourth, from the projected demand for products, it is necessary to estimate the total demand for the product of each industry. While the output of the automobile industry represents primarily final products, the output of the steel industry does not. Hence, information must be developed on the production of all industries consistent with the estimates of final products. This, too, may be done by various methods. Regression analysis of production in each industry against final product demand is one method, while input-output analysis is another.

Industry Employment is Estimated

The fifth step is to translate the production of each industry into employment by the application of productivity trends or output per man-hour to obtain the projections of the total number of man-hours of work required for the industry to produce at the indicated level. Then, by applying the average number of hours per worker per year, this total can be translated into employment.

Occupational Demand is Estimated

Finally, in order to project employment by occupation, information is needed on the occupational composition of each industry. This information can be used to disaggregate total employment by industry into employment by occupation. The occupational composition of each industry in the United States has been brought together in an industry-occupational matrix, based largely on 1960 data. The matrix is being made current, and studies have been made projecting into the future the changing occupational composition of each industry on the basis of technological change.

Special Supplemental Studies Needed

I have hastily and superficially reviewed the general analytical approach to projecting demand in a variety of occupations. This approach is useful particularly for those occupations that are widely dispersed among industries. It is useful largely in getting a first approximation of the projected requirements. Experience has shown that, to the extent possible, independent studies should be made for each industry examining changing technology, changing markets, etc., to obtain more insight than can be obtained in a general, across-the-board analysis. Similarly, the changing character of each occupation must also be carefully studied. This, then, is an eclectic method using a variety of approaches to check one result against another in the attempt to identify possible errors.

A MODEL BASED ON INPUT-OUTPUT ANALYSIS

Jack Alterman

I have just completed a report on a set of alternative assumptions related to the United States economy in 1970 which we have been working on for some three years. It is impossible to summarize adequately this undertaking in the limited time available, but I will indicate what we tried to do. As you know, there is a long history of the application of input-output analysis to manpower analysis. Several years ago--in anticipation of a new input-output table which was being developed by the Department of Commerce as a part of an integrated set of national income, product, and input-output accounts--a project was started involving a number of Government agencies and research organizations outside of Government. The project was set up to develop alternative projections of potential demand, interindustry relationships, and employment, using input-output analysis as a framework for the projections. Briefly, this involved developing projections of gross national product using different assumptions about the rate of unemployment and about the mix of final demand among consumption, investment and Government expenditures. A further detailed distribution uses a variety of methods for each of the components--consumption, investment, Government expenditures, net exports, etc., classified by the interindustry framework which includes about 85 industries. In addition, the input-output relationships are projected to 1970 so that final demand can be related to total output by industry. By projecting productivity on an industry-by-industry basis it was possible to estimate employment by industry--which should then add to total employment. If it does not, it is necessary to repeat the above process.

Import and Capital Requirements Can Be Projected

As a by-product of the above program, and this has particular applicability in the developing countries, the structure of import requirements could be estimated in terms of the structure of demand and its impact on the level of production, industry by industry. These demand requirements may be met by increasing domestic production or by necessary imports. Secondly, they make it possible to determine capital requirements. This is done by tracing the impact of increased demand on final products, then total output, then rate of growth by industry. If we have some notion of the relationship between capital and output by industry, it is possible to estimate capital requirements. This, in turn, permits the determination of investment expenditures by industry and in the aggregate. Through the use of a capital-flow table, developed in the Bureau of Labor Statistics to supplement the conventional input-output tables, it is possible to convert capital expenditures by purchasing industries to output of capital goods for each of the capital-goods industries in the economy. Hence, a balanced set of demand estimates for output, investment, employment, and so on, can be derived.

Employment Projected

The employment projections developed by the program are based on alternative assumptions regarding rates of unemployment and the mix of final demand. The composition of final demand is dependent to a considerable extent on how long the recent high rate of demand for consumer and producer durables will continue, and at what rate they might become stabilized. Since we do not know, we are employing alternatives rather than selecting a single "best" estimate. This process resulted finally in the projection of alternative levels of employment. Back of the employment projections are all the projections of GNP, final demand, output, productivity, input-output coefficients, and capital flows.

The next stage will, of course, be the conversion of employment estimates into occupational requirements and the delineation of the implications which these may have for training and manpower development.

PROJECTING MANPOWER SUPPLY

Sol Swerdloff

Projections of supply in specific occupations have been limited primarily to occupations which take a long period of training or for which there are formal training methods. For occupations which are learned in a short time, we do not really need to estimate the future supply. Also, occupations requiring little training or which workers enter without formal training programs have no informational basis from which to make estimates of the future. In estimating the supply of workers in an occupational field for some future year, it is first necessary to estimate the size of the current supply and then estimate the probable increments to the field and subtract the probable occupational losses. The current supply of workers can usually be defined as the sum of the number of persons employed in the occupation and those unemployed workers who are seeking work in this particular field. The entrants into an occupation are derived from a number of sources: first, persons entering the labor force after completing a training program designed to prepare them for this occupation; second, labor force entrants who have completed a training program preparing them for some other occupation related to this occupation;

third, persons, other than students who are not in the civilian labor force, such as retired persons or women returning to the labor market; fourth, persons employed in other occupations who transfer into this field; and, last, immigrants who enter the occupation. The estimated occupational losses will include the number of persons who will retire or die during the forecast period, who will transfer to other occupations, or who will leave the labor force for any reason.

In estimating the current supply we use the definition of "employed" and "unemployed." This differs from the potential supply of workers, which includes all workers who could perform that kind of work regardless of their decision to work in this occupation or in another occupation. Many people possess more than one skill and can work at more than one occupation as circumstances dictate or opportunities allow.

Persons Newly Undertaking an Occupation

In determining new entrants we can obtain data on college graduates from the Office of Education, which follows the flow of people by age groups as they pass through the educational system and, hence, the number of graduates by the various fields of study. For some occupations, such as engineering, they have determined the number of first-year students and have calculated the number who will complete their training.

The next problem is to determine how many of those persons who complete their education in a given field will actually enter that field. This is not really very high. Some graduates will go on to graduate school, others will enter the labor force in other fields, and, conversely, some of those who graduate in other fields will enter the occupation under consideration. We have made some estimates on the basis of studies of the work experience of graduates two and five years after they leave the university as to how many actually enter their field of study. In this process, consideration must be given to those people who, during the course of obtaining degrees--especially at the graduate level, are already part of the labor force. For example, of the students who are receiving Masters Degrees in engineering, some 80 percent are already employed in the occupation. We would be double-counting if no adjustment was made.

We must also include other persons who will enter the field; for example, technicians who may be upgraded into jobs normally requiring a college degree. In addition, adjustments must be made for people transferring into the occupation from other occupations or persons reentering the labor force who have been retired, who are returning from the Armed Forces, or who had left for some other reason.

Losses from the Occupation

From the estimates of current supply, deductions must be made for the losses to be experienced during the forecast period. Estimates of deaths and retirements can be obtained from an age distribution within the occupation and a working life table. Additional adjustments must be made for transfers from the occupation to another field which, in many cases, represent a sizable loss. In many occupations the impact of losses due to death, retirement, and transfer is greater than the net increment in the occupation over a forecast period.

ADJUSTMENTS DUE TO CONSTRAINTS ON SUPPLY

Harold Goldstein

As I mentioned earlier, the projection of demand that we make initially on the basis of past relationships must be compared to the projection of supply, including the constraints on training. On the basis of this comparison, an analysis must be made of the adjustments industry is likely to make to the constraints on supply; then, a second projection of demand is necessary. Often it is necessary to make a series of approximations before a final projection is made. This process, therefore, explores fully the policy choices before the country. Should training be expanded in these occupations as much as the projection implies, or is it better to try to increase the utilization of a more limited number of persons? What is the implication for wage rates or the equalization of related occupations? All of this can be analyzed by comparing demand and supply in successive steps.

Local Area Estimates

The projection of manpower requirements in specific localities is an additional problem. We have been talking only about the general, national manpower requirements. Work is now being undertaken looking to the development of projections of manpower requirements and supply in the separate States and in local areas. This is a cooperative project between the Bureau of Labor Statistics and the Bureau of Employment Security to develop techniques for the better utilization of national economic projections, national economic information, national information on the changing technology of each industry, the changing occupational composition of each industry, etc. Until now the primary method of projecting manpower requirements in localities has been to ask employers how many people they expect to employ several years hence. It was felt that this approach could be fruitfully supplemented by making available information on nationwide trends, on nationwide markets, on the demand that affects the levels of employment in the industries in each locality, etc. The important thing is to develop techniques for studying the relationships between trends in employment for each industry in each locality and those in the country as a whole.

I would like to make a few general comments before touching on how this approach may be usefully applied in some of the developing countries. First, in addition to developing general models for projections, it is necessary to make intensive studies of each occupation and industry in order to supplement and gain more insight into the general projections. Second, the projection of such things as the attrition in each occupation from death, retirement, and other factors will often be a more important component of the total training needs than the projections of the net growth in demand. Finally, whether one is dealing with a developed or a developing country, it is extremely important to continue to make studies and projections and not rely completely on one study or one projection. Too often technicians have gone into a country intent on making one study, which is then presented to the government, and the technical group leaves. Each country must develop its own staff to make studies, and the competence to review and revise the projections continually, because projections--being what they are--may be wrong and because the real situation changes.

Data Needed to Make a Projection

In considering the approach we have presented, it seems useful to mention the kinds of data that might be required--especially in view of the generally more limited data that are available in developing countries. First, population and labor force measures for the past are necessary, as well as projections of these measures. Data are needed on employment, production, and hours of work in each industry for the past so that the relationships between production and employment in specific industries can be studied to obtain productivity trend measures. A system of national accounts is needed. Mortality data by age are required to develop tables of worklife for estimating death and retirement losses. An interindustry relationship table must be developed if one desires to use input-output analysis.

There are many countries, however, which do not possess even the rudiments of these data. One, therefore, has to develop other methods. It seems apparent that very early in a country's development, attention must be given to the development of at least some of the basic economic statistics described above, not only for manpower analysis but for many other purposes.

If a country has a development plan, the manpower projections will be simpler to the extent that the plan outlines the production goals or facilities' goals--facilities which affect the number of work places--which can be used to furnish the targets, which we must project in the United States where no central planning exists. If a new industry is being introduced into a country, the occupational composition, the relationship of employment to production, etc., will not be available. Here, a very different approach must be used. One of the essential techniques in this case is the use of the experience of other countries, as suggested by Dr. Morris A. Horowitz.

Projection to be Made for Nonagricultural Sector Only

In our presentation, we have been talking almost exclusively about developing projections for the entire United States' economy. In a developing country, however, where approximately 80 percent of the labor force is engaged in agriculture and where the developing sector is a very small percentage of the total, an elaborate analysis for the whole country is probably not justified.

Agriculture may represent not an area of demand for labor but, instead, an area where underemployed labor is stored. The techniques presented in the approach I have discussed are applicable only to a small, developing sector of the economy.

DISCUSSION

Question from the floor

My question is directed to the use of the input-output model specifically for developing countries. One of the most difficult things in the model is the determination of the technical coefficients of production. Could you indicate whether the model is or is not applicable to developing countries and how the technical coefficients of production are developed in these areas?

Comment by Mr. Alterman

From my limited experience related to the developing countries, I believe that input-output analysis has been only occasionally applied due to the limited data available from something like a census of manufacturing. Where it has been applied, direct surveys have been taken in the nonagricultural, developing sector of the economy--which includes a relatively small, basic manufacturing component. Very often an industry consists of only three or four plants, and interviews can be conducted directly to obtain information about inputs and level of output to derive these coefficients. This is then fitted into a broad framework which, presumably, ties into the national income and product accounts. Hence, it is a reliance on primary sources rather than the use of secondary sources, as is done in the United States. From the point of view of determining the impact of changing technology on the production coefficients, one may well be at an advantage talking directly with plant managers and grappling, in real terms, with the problem rather than drawing inferences from secondary source information.

Question from the floor

Can the matrix developed in the United States be applied in disaggregating an economic development plan in a developing country into potential manpower needs?

Comment by Mr. Goldstein

I would not suggest that the occupation-industry matrix for the United States be applied to a developing country except as a last resort. This is true even in the case of an individual firm such as a steel plant. Although it would be easy to apply the occupational composition pattern from the steel industry in the United States to estimate manpower needs, I would rather look at the specific plant to be built and the kind of technology that is to be applied, and then get data or have a survey made of the occupational composition of a similar plant with similar technology and size in a country with a similar level of development or perhaps a slightly higher level than the country where the projection is to be made. This, I believe, is the kind of analysis that will be suggested by Dr. Horowitz and his colleagues. There are many reasons why the occupational composition of a particular industry in the United States would not be relevant to that in the developing country.

Question from the floor

It seems to me that no clear relationship has been drawn yet between requirements and resources. To what extent do you do your forecasting of requirements and resources separately and actually subtract to obtain the deficit; what assumptions are made; and, finally, to what extent are the forecasts made simultaneously?

Comment by Mr. Goldstein

Conceptually, we try at first to make a pure, uncontaminated requirement projection assuming that you are dealing primarily with an equation in which 'X' is the number of people who must be trained to meet future needs. When this projection has been made, it is necessary to go back and make a projection of the resources or supply to try to evaluate whether you can, in fact, obtain this volume of training to meet the projected needs. It may be found that it is not reasonable to expect that, within the time period and with the given level of resources available, this target can be reached. It is then necessary to review the initial projections in terms of the policy problems raised by the disparity between potential demand and potential supply, and to determine alternative ways to meet the demand, e.g., by more fully utilizing the avaialble workers in this occupation or by increased use of partly-trained technicians to reduce the demand for fully-trained professionals. This is, in effect, a review of the policy alternatives. A final requirements projection can then be made allowing for substitution or other policy measures that may be taken. This projection will be more realistic because it takes into consideration requirements for alternative resources and for alternative occupations.

Comment by Mr. Swerdloff

In looking at the information on past trends to estimate requirements, it is necessary to take into consideration whether there has already been some adjustments made in supply. It must be determined how different the supply-demand relationship will be in the future compared to that in the past. These past accomodations will assist in understanding better the future accomodations to be made and, hence, the assumptions with respect to the future.

Part II: INTERNATIONAL COMPARISONS OF INDUSTRY-OCCUPATIONAL STRUCTURE
Morris A. Horowitz

Discussants: Manuel Zymelman and Irwin L. Herrnstadt

Origin of the Method

The international comparison method of manpower projections is not an original idea with us at Northeastern University. In the literature related to the forecasting of manpower requirements, reference has often been made to the international comparison method of manpower projection. The concept is usually footnoted by something to the effect that it is a useful idea but difficult to apply because no statistics are available. Instead, other methods are usually suggested--such as projecting past trends or using the statistics of highly-developed countries like the United States--but the problem with these approaches is that the data are either not available or not appropriate to the developing countries.

My particular interest in this field came after I visited Latin America and saw foreign experts suggesting the use of trend data as a basis for projecting manpower requirements. It was obvious, however, that past trend data were not available to these countries and, even if they were, interest was not in following this trend but in breaking radically with tradition and establishing a new development path. The whole purpose of making economic plans in developing nations is to do something different.

Our basic objective is to offer these countries an alternative so their experts do not have to rely on data from the United States or on trend data from their own country. The project was supported by the AID Bureau of Latin America, and while oriented to the needs of the Latin American countries, the approach is applicable to any developing country or, for that matter, to all countries except those at the very highest level of development. Nations at the highest level of economic development cannot effectively borrow from the experiences of other countries as the courses they will travel are as yet uncharted.

The Basic Idea

The basic assumption of the project is that there exists some relationship between the level of productivity of a specific industry in a country and the occupational structure of that industry. The hypothesis is that in moving from a country with a relatively high level of productivity to countries with lower productivity, differences in the occupational structure of any given industry are rational. If so, they are predictable and, presumably, it is possible to insert into the framework any level of productivity a developing nation is interested in obtaining in the future. We first tested the hypothesis with United States data since these were the most readily available. Having investigated regions in the United States as if they were independent countries, we found that correlations between productivity and occupational structure were rather high, indicating that--as one moves from high-level productivity to lower levels--occupational structure does change in a rational fashion.

The next step was to gather data from countries in various stages of development. We obtained information I believe not available from any other source throughout the world. The data was placed on IBM cards and reorganized to a point where we felt occupations and industries were more or less comparable. Obtaining comparable information on occupations was exceedingly difficult due to translation and definitional problems. Once a uniform structure was developed, country tables--our basic data--were constructed. For six of the 20 countries studied, two tables were prepared for different time periods in the country's development. Fifty-eight industry groups were analyzed. For a number of the 20 countries, tables were prepared cross-classifying occupations and level of education attained by persons working in these occupations. A number of countries, however, did not have this kind of detail by occupation. Efforts were made to set up a uniform level of educational attainment, but we were unable to achieve satisfactory results.

Use of the Data

The type of table we felt would be useful for developing countries is one which summarizes occupational composition by industry in each of the 26 countries. The theory is that a developing nation planning the expasnion or development of an industry can assume it will have a level of productivity similar to that of one of the listed countries during the forecast period and, hence, will be able to identify an applicable occupational structure for achieving this goal. Theoretically, the choices are unlimited. Whether or not occupational skills can be developed is a question of supply, and not appropriate for discussion at this time.

The basic approach can be explored at two levels: an analysis of the methodology involved, and an analysis of statistics and other data underlying the approach. A discussion of methodology is meaningless unless basic statistical data are sufficiently reliable to warrant their application in the manner described above. Three or four years ago this approach would have been impossible because data were not available, but now we feel we have sufficient information to permit a country to benefit from the data of another country. It is fitting to point out that we are discussing a highly-sophisticated technique and not merely putting forth a "cookbook recipe" whereby one country accepts the structure of another without refinements. In our final report, we hope to have, in addition to the sets of tables, an analysis of the entire approach and a manual explaining how the technique should be applied.

With this supplementary material, technicians in developing nations will be able to use the comparative tables with some degree of sophistication and avoid mechanical application of the data.

PROBLEMS OF OCCUPATIONAL CLASSIFICATION

Irwin L. Herrnstadt

Our occupational structure is the result, first, of occupational detail reported by other countries and, second, of those occupations we considered important. We initially intended to develop an occupational schema that emphasized skill levels, particularly technical and manual. Since this proved impossible, we relied primarily on the occupational titles of reporting countries themselves. Occupational detail is equivalent to the three-digit ILO, International Standard Classification of Occupations code and, occasionally, is at the most detailed or five-digit level.

There are problems with our type of classification. First, there are inevitable response errors. Some people report themselves doing other than what they really do--a common error in a population census. Second, even if people state their occupations correctly, it cannot be assumed that job content is the same for occupations having the same titles. For example, a weaver may be a hand weaver or a machine weaver, not to mention the specialties that exist within these two classifications. We tried, wherever possible, to obtain the occupational dictionary used by each country to code its census. These, however, were not always available and in some cases where they were, we could not obtain translations. A third difficulty is the failure of countries to report data in the same detail, or if they do, to combine it in the same manner. Sometimes the only classification possible is "other." Finally, much occupational data are classified by process or industry. For example, manual workers in the chemical industry may be identified only as "chemical workers"--industrial rather than occupational information.

Some of these problems are less severe with professional and technical occupations, because they generally are not linked to particular industries, and the definitions of such occupations are likely to be more comparable among countries than definitions of lower level occupations. If a country reports so many lawyers or doctors, the figures probably are accurate, given variations in quality. It is fortunate that the kinds of occupations for which planning is needed--those of a higher level--are the ones that tend to be reported most accurately. Supervisors and foremen, and skilled production workers are, however, the two major exceptions. There is greater comparability among industries in different countries than among occupations. Still, the chief problem is differences in composition of industries bearing the same titles. A specified industry in an advanced country is apt to have a more diversified product mix than the same industry in a less-advanced country.

DISCUSSION

Question from the floor

Will tables be available for government services and agriculture?

Comment by Mr. Horowitz

Yes. We have had to drop retail and wholesale trade because there was no way of ranking relative productivity among countries. In some cases, for example fishing, we had to rank countries by tons of fish caught; and in coal mining, by tons of coal mined. In manufacturing, ranking by level of productivity was relatively easy; for non-manufacturing, it was much more difficult.

Question from the floor

How did you rank general government services?

Comment by Mr. Zymelman

The only measure we could find was the amount of money handled per government employee.

Question from the floor

What measures were used to rank levels of productivity in agriculture?

Comment by Mr. Zymelman

Value added as reported in censuses. Frankly, this is not a good measure, or, at least, there is no well-defined relationship between occupational structure and value added in each country.

Question from the floor

How was productivity ranked for education?

Comment by Mr. Zymelman

Three measures were used, none of which worked well. These were the number of pupils per teacher at the elementary, secondary, and university levels. This is really an area of judgment as no absolute measures exist.

Question from the floor

It seems to me that in manufacturing your criterion of value added per worker primarily reflects two things: the internal price structure of the country and the product mix of the country. If this is the case, then it is not a very good criterion. Why did you not use capital per worker?

Comment by Mr. Zymelman

From experience, we found it much easier to count people working with capital than to measure the capital itself. One of the things for which these tables can be used is to rank the level of productivity of various countries by the occupational composition of the industry itself. This would be the reverse of what we are doing here. You will notice in some places on the table, productivity data are not indicated because they are not available. In other cases, data were published, although it is doubtful that they were correct. However, it is often possible to insert an industry in between two structures which are known and compare it to them in this way.

In addition, what is important in international comparisons is not the price structure but exchange rates, although they themselves reflect the price structure of a country. Moreover, one must also consider tariffs. A thorough study on the comparison of productivity across country lines should include all of the above plus an analysis of each industry and the tariffs each country imposes on imports. Isolating the influence of the tariffs changes many productivity comparisons. For example, at the time of the survey, the mining sector in Chile was producing some $240,000,000 worth of product at a given exchange rate. However, if the number of tons of product were multiplied by the international market price, the product would be $480,000,000. This fact indicates that the mining sector in Chile was subsidizing some manufacturing sectors. If tariff rates had been introduced into the calculation of productivity by industry, it would have made a significant difference in the example presented above.

In summary, I feel that such measures as energy used per worker or horsepower per worker are viable measures of relative productivity, but that the amount of capital per worker or any other monetary measure, in light of our experience, would be most difficult to calculate accurately. I might add, however, that even a measure of energy per worker in kilowatt hours, which is highly indicative of productivity **in many industries,** is not applicable in Sweden and Norway where electricity is inexpensive and, therefore, used disproportionately more than in other countries.

Comment by Mr. Horowitz

Value added per worker figures were compared with other measures of productivity and in most cases were quite similar. These other non-monetary measures were used to identify those instances where value added productivity figures were not satisfactory and the country's rank changed to reflect this fact.

Comment by Mr. Zymelman

Instead of using one figure to reflect the level of productivity as we did in our study, I would suggest ranking countries in terms of productivity ranges. Our figures reflect a high level of error, perhaps 20 percent, and hence, the range represents a more realistic way of looking at productivity measures.

Question from the floor

Would you explain briefly how the basic hypotheses were tested?

Comment by Mr. Zymelman

We used multiple correlation analysis to test our basic premises although this can be misleading. We began our analysis by testing regional data for the United States and computed an r^2 greater than .6. Therefore, we can say the relationship is not due to chance. Anything with an r^2 below .5 was discarded. The results of this analysis indicated that the hypothesis provided a valid measure for the United States and for several industries on an international basis. In the case of the food industry, for example, we obtained a correlation of .84, using six major occupational groups. We also found the correlation much higher when detailed occupational groupings were used. A measure of the elasticity of each basic occupation with respect to productivity was considered to be most important once appropriate adjustments were made.

A country desiring to use the data we developed should not form an economic plan which expressly stipulates a level of productivity, but should accept as its target some rate of increase, i.e., 5 percent or 6 percent per year. This transforms what is basically a static approach into a dynamic approach. An economic plan realistically does not call for an occupational group of a given size in a target year: for example 10 percent of the labor force in engineering in 1970. Instead, it implies a growing proportion of persons in that occupation during the duration of the plan, i.e., 8 percent in 1958, 9 percent in 1964, etc. It is desirable, then, to have a group or "path" of values in the plan for targets will not be met if certain preconditions are not fulfilled. Basically, the optimum application of data from this table would be in the determination of a certain rate of change in the growth of an occupation relative to a certain rate of change in productivity.

Question from the floor

Assuming one can use this kind of cross-sectional data for time-series analysis, is it not possible, and even preferable, to transform the data into logarithms to obtain elasticity coefficients?

Comment by Mr. Zymelman

Yes. If you derive logs, you will obtain elasticity coefficients, but when you use 1 = a to x^b--the log of arithmetic equations--the value of "a" will greatly affect the value of "b". Assuming different values of "a"--essentially an unknown variable--will so affect the value of "b" that great care must be taken in interpreting results. For example, in the chemical industry we know that if the number of manual workers are plotted against productivity over time, transformation into double logarithms yields a straight line indicating that as productivity goes up, the number of manual workers required decreases. On the other hand, if one takes "b" and runs a correlation in order to obtain a high value of "a," the value of "b" becomes negative.

Question from the floor

I believe it would help me to understand better the adjustments that were made in the ranking of the levels of productivity by country if you could explain to me why the Danish chemical industry, with a level of value added per worker of $4,800 in 1960, is ranked behind the United Kingdom, where the same measure was $3,560 in 1961.

Comment by Mr. Zymelman

Estimates of productivity in Denmark were taken from local sources and converted to dollars by the application of the exchange rate. These data indicate that from 1950-1960, productivity in the Danish chemical industry increased 120 percent. Such a figure is inordinately high and suggests the 1960 productivity measure is extreme, especially in comparison with the United Kingdom, which we were able to evaluate very adequately, using actual physical measures of output.

Comment by Dr. Horowitz

I wish to point out that the last three years were not spent merely collecting data; much time was given to its organization, analysis and better understanding. The ranking of countries is not based solely on productivity measures, but is in fact a composite based on value added per worker, judgment as to how accurate the value added measure is in each case, and how indicative other factors may be.

Question from the floor

It is not yet clear to me why you are trying to explain the relationship between the structure of occupations and productivity.

Comment by Dr. Horowitz

We have tried to rank countries at varying levels of productivity or at least determine if there is a relationship between countries at varying levels of development so that a given country which wants to utilize some occupational distribution by industry can select another country which it hopes it will be similar to at a given point in time. For example, one component of a development plan may be to achieve a level of productivity in the chemical industry similar to Chile's in 1960. The tables could then be used to indicate certain appropriate occupational composition patterns for that industry commensurate with the desired level of productivity.

Question from the floor

When you try to measure and compare levels of productivity, there are always certain complications involved due to problems of evaluation, assumptions of individual preference, or relative prices. I wonder if, in fact, it is necessary to introduce this exercise. An alternative would be to explain the occupational structure itself, or, to explore the relationship between occupational structure and total volume of production. I should like to know, therefore, why it was that you used productivity as the measure to rank various countries?

Comment by Mr. Zymelman

This can be explained through an examination of the simple production function. The level of output is a function of capital and labor inputs as shown in the equation:

$$Q = t\ (K, L)$$

Where:

Q = the level of output

K = Capital

L = Labor

But this is not correct because the labor inputs are not identical, hence we have:

$$Q = t\ (K, L_1, L_2, L_3 \ldots\ldots L_n)$$

Now, making capital a technical function of labor $(\frac{K}{L})$--the proportion of capital to labor in general--we have:

$$\frac{Q}{L} = F_1\ (\frac{K}{L}, L_1, L_2, L_3 \ldots\ldots L_n)$$

Introducing a second function, we assume the proportion in which capital and labor are used depends upon the types of skills employed (i.e., if a mechanical plow is used, you need a mechanic and, to push the plow, a farm laborer):

$$\frac{Q}{L} = F_2\ (\frac{L1}{L}, \frac{L2}{L}, \frac{L3}{L} \ldots\ldots \frac{Ln}{L})$$

Where $\frac{L1}{L}$ = to the proportion of persons in occupation L_1 to the total labor force.

A valid criticism is that the production function does not incorporate substitution between various occupational fields. If the probability of substitution were known, it certainly would be included.

Question from the floor

The Point is that the capacity for substitution between different skills or between different divisions of labor affects the distribution of capital resources. Your method, then, assumes these factors out of the problem. Let me suggest the alternative of including capital resource structure in the analysis, recognizing problems of data and so forth.

Comment by Mr. Zymelman

You would assume then, that each newly-hired worker in an industry would require, let us say, \$10,000 of capital (K). However, this is not simply K, but a specific type of capital (K_1). This would differentiate between one automatic loom for example and 10 manual looms which may have the same value. My contention is that a specific distribution of occupational structure implies a certain kind, rather than amount, of capital.

Question from the floor

I think that production is not solely a function of capital and labor but depends upon certain other things such as the structure of the production process, the scale of enterprise, and the influence of technology on capital.

Comment by Mr. Zymelman

The problem of size is avoided by reporting occupational composition patterns by country. Prevailing size of plant characteristics are thus reflected in occupational structure.

Question from the floor

Are you referring to the sophistication of technology that a given level of capital will buy?

Comment by Mr. Horowitz

When we talk about value added or productivity per employee, we are saying that there is a relationship between the level and kind of capital and occupational structure. We are not assuming a linear-homogeneous production function. Halving the amount--not type--of capital used will result in a different ratio of administrators, managers or foremen, thus a different occupational structure and level of productivity. And how does one rank countries in terms of this mobile structure? By total output? For example, total output in India may be very high but I do not think many developing nations would want to use India as their target.

Question from the floor

Did you attempt to disentangle institutional, social, and cultural factors in order to form a better analytical framework for analyzing their influence on the data?

Comment by Mr. Horowitz

We did try to get this kind of information and have it for some countries, but it is both limited and sketchy, since much of this information is available only through personal interview. We have the detailed industry mix for different countries which suggest some influences of institutional and social factors, but difficulties in quantifying this data limit its use. We also have distributions of the size of plants in different industries by country. Other than this, we have only sketchy information on different countries and industries. In any case, I am not sure how these factors could be integrated into a study such as ours.

Question from the floor

In highly-developed countries, a large number of persons are engaged in occupations such as research and development. Their activities may or may not reflect value added in some future year. The size of that complement may, in fact, be a function of value added this year, i.e., how well the company is doing, tax write-offs available, or government grants. This may make the occupational structure very suspect, for a country which is making a forecast may not elect to engage in such activities.

Comment by Mr. Zymelman

The ideal way to handle such situations is to use an average of value added over a given period. In addition, occupational structure reflects only a point in time when data collection was made. The same is true of productivity as data is gathered for a given year. It would be useful to average value added with occupational structures over time rather than at a given moment.

Comment by Mr. Horowitz

We tried initially to obtain value added figures for a three-, four-, or five-year period around the year we wanted to include in the study. These data, however, were not available, hence we had to use figures for a single year.

Question from the floor

It is evident from the countries included in your study that, with three exceptions, they are among the more advanced. Has there been any thought given to going to the developing countries themselves to supplement these data. Has any thought been given to "discount factors" relating to intangibles in a developing country which do not permit the actual reproduction of another or higher level of productivity?

Comment by Mr. Horowitz

We realize that it would have been useful for the really underdeveloped countries to have data related to countries with less than an annual value added per employee of $880. As you mention, however, data limitations were such that it was extremely difficult to obtain this information from secondary sources.

Comment by Mr. Zymelman

Let me add that I believe it a mistake to assume developing countries will have a low productivity in the future. Income per capita will continue to be low, but only because the manufacturing sector will remain small in relation to the total economy. Take, for example, the case of Puerto Rico. In many manufacturing sectors it ranks higher in productivity than most European countries. This is a key point. For example, there are significant and often overwhelming problems in attempting to compare the economies of France and Chile. But if we compare the glass manufacturing industry in France with that in Chile, the analysis is more meaningful and we encounter less problems. It is because this information is available on an industry-by-industry basis that it is possible to utilize it across country lines. I would even go further and suggest that total manufacturing may be closely related within countries. The distribution of relative productivity of manufacturing in each country has a very small dispersion. In other words, you will not find an industry with an average value added of $5,000 to $6,000 in a country where the average value added in manufacturing is $1,000.

Question from the floor

To what extent are you able to disaggregate this data into sub-industry groups or estimates for a number of firms within an industrial sector?

Comment by Mr. Horowitz

The end product is in industrial groups because data could not be broken down any finer. The industry mix, however, is fairly common in most countries. Very few countries have single-product industries, thus comparison of the composite really makes more sense than comparison of a single product. The single product may actually be open to more radical changes in the production process than a composite because different processes may tend to level out productivity differences. This has been verified statistically in the few tests which have been applied.

Comment by Mr. Zymelman

We should also remember the level at which planning is done. An industry is one level of planning while an individual plant or group of plants is another.

For the most part, central planning is carried out at the industry level. In certain cases where individual plant estimates are needed, however, it may be better to survey individual plant facilities or rely on estimates made by industrial engineers rather than to use the tables.

Part III: A SYSTEMS ANALYSIS APPROACH TO HUMAN RESOURCE DEVELOPMENT PLANNING

Frederick Harbison

Introduction

The "manpower approach" to educational planning has long been a subject for heated debate among educators and economic development planners. Actually manpower analysis is a new and evolving art which employs diverse media and methods of expression, thus its conceptual framework is not yet frozen, and its methodology is neither orthodox nor rigid. Free thinkers with creative ideas in the field are not yet smothered by technical purists insisting on rigorous but narrow forms of analysis. To be sure, there is widespread confusion about the nature and scope of the "manpower approach." Many of the working hypotheses underlying manpower analysis need to be revised or discarded, and new concepts should be introduced in the light of evolving experience.

The major thesis of this paper is that **the** "manpower approach" should encompass much more than a tabulation of "heads and hands" in precise occupational categories. It must go far beyond the construction of purely quantitative forecasts, projections or targets for formal education. It should be related to a broad strategy of human resource development rather than to a narrow concept of education planning. Finally, it is time to discard the notion that manpower needs are derived solely from requirements for economic development. No developing country is interested merely in the growth of its economy--in increasing its national product or income. All have broader aspirations for social and political modernization. Thus, manpower and educational planning should be related to "national development"--a term which encompasses economic, cultural, social and political development in the building of national identity and integrity.

Without questioning the usefulness and importance of the kind of quantitative analysis which is characteristic of most manpower surveys, I suggest that it may now be appropriate to use, in addition, some of the concepts of systems analysis. It should be possible to look at the various constituent elements of human resource development as a system which is somewhat analogous to a system for the generation and distribution of electric power. In using this frame of reference, one can identify skill-generating centers, such as schools, universities, training institutes, and employing organizations, which develop skills on the job. The linkages between such centers are analogous to transmission lines. The manpower problems encountered by developing countries such as skill shortages and labor surpluses may be thought of as attributable to power failures in particular generating centers, ineffective linkages between these centers, or faulty design which results in the failure of the total system to carry the loads expected of it. A system of human skill-generation, like a system of electric power generation, should be designed to carry varying loads; it must have built-in flexibility to meet such loads; it must be adequate in size; and, above all, its components must be properly balanced. The systems analysis approach makes it easier to identify in operational terms major problem areas, and it compels the analyst to examine the critical interrelationships between various manpower and education programs. It provides a logical starting point for building a strategy of human resource development. I am indebted to John G. Hilliard of the Ford Foundation for the power plant analogy.

Major Human Resource Problems in Developing Economies

Let us now identify the major human resource problems in developing societies. They are: (1) Rapidly growing populations--almost without exception the developing countries are experiencing rates of population growth in excess of the average world rate, and these rates of growth themselves are rising; (2) mounting unemployment in the modern sectors of the economy as well as widespread underemployment in traditional agriculture; (3) shortages of persons with critical skills and knowledge required for effective national development; (4) inadequate or underdeveloped organizations and institutions for mobilizing human effort; and (5) lack of incentives for persons to engage in certain kinds of activities which are vitally important for national development. There are obviously other major human resource problems such as nutrition and health, but these lie for the most part in other technical fields and are beyond the scope of this paper.

Most manpower and education planning experts agree on the fundamental importance of an analysis of population distribution and trends. It is particularly important to have some conception of the annual rate of population growth (and whether this rate is increasing or remaining constant), the age distribution of the population (with particular reference to those under fourteen years of age), and the approximate size of the "active population." Some calculation of the probable size and composition of the labor force is also essential, although with rare exceptions reliable labor force statistics are non-existent in most developing countries. Here it is important to distinguish between the labor force in the modern or monetized sector of the economy and that in the traditional sector.

Population Growth

In nearly all of the developing countries, one can assume that population is growing at rates in excess of 2 percent per year, and in most it is climbing toward 3 percent or more. This suggests that in most cases, at least two-fifths of the population is likely to be less than 14 years of age and hence, not considered to be in the labor force. It also means that a high proportion of the population is of school age--a matter of great consequence for education planners. These high rates of population growth contrast with the situation in the advanced economies. There is scarcely an instance of a developed country with a population growth rate in excess of 2 percent and most have considerably lower rates. Moreover, very seldom has a country experienced development concommitant with high rates of population increase.

The manpower analyst, of course, is particularly interested in the present and future size of the labor force, its growth rates in both the traditional and modern sectors, and the factors which determine labor force participation of various groups. Of necessity he must also be concerned with the consequences of policies to limit population growth. For example, a reduction in birth rates will not immediately lead to a reduction in the labor force, but at the same time it would probably increase a country's propensity to save and to invest in productive activities. Population control, therefore, in addition to its other obvious benefits, may contribute directly to greater labor productivity. The human resource development strategist must now give closer attention to population problems and assume greater responsibility for proposing population control measures.

Unemployment

Mounting unemployment in urban areas is probably the most serious and intractable problem facing today's newly developing countries. Unemployment rates as high as 15 percent of the labor force in the modern sectors are not uncommon, and even in rapidly industrializing countries, unemployment rates seem to be rising rather than falling. The reasons are fairly clear.

Relatively high wages in the modern sectors act like a magnet drawing persons away from the rural, agricultural area. For example, in many developing countries, the earnings differential between the modern and traditional sectors is in the neighborhood of eight-to-one, even though it is suggested by W. Arthur Lewis that a feasible ratio would be two-to-one. Primary education raises the aspirations of rural youth to escape from traditional agriculture into the modern sector. Jobless immigrants to the cities can be fed and housed for considerable periods by relatives who already have employment. And behind all of these factors is a rapidly swelling labor force resulting from ever-increasing population growth.

As a rule of thumb, the rate of increase in the labor force in the modern sector will exceed the rate of increase in population growth. Thus, if a country's population is rising at 2 1/2 percent annually, the increase in the labor force in the modern sector is likely to be three or even 3 1/2 percent per year. On the other hand, the rate of increase in new employment opportunities is limited. At the very best, new jobs are created at a rate only half that of the increase in national income. Thus, if national income increases annually at a rate of 5 percent, the highest possible increase in new jobs may be 2 1/2 percent. Indeed, in most countries the rate of increase in new jobs is only a third of the rate of increase in national income, and in some, national income has increased substantially without any expansion of employment in the modern sector. For example, the GNP of Venezuela has recently grown at a rate of 8 percent per annum. At the same time, population has grown at an annual rate of 3.5 percent while the labor force in the modern sector has grown at a rate of 4 percent. Because job formation (3 percent per annum) has lagged behind the growth of the labor force in the modern sector, unemployment has steadily mounted. In Tanzania, Kenya and Zambia, rising GNP has actually been accompanied by falling employment. Generally, for every three percent increase in national income, there is a one percent increase in job opportunities.

Unfortunately, greater investment and the building of more industries in the cities appear to aggravate rather than to alleviate the unemployment problem--the number of jobs increases, but the number of those seeking them increases even faster. The human resource development planner is thus faced with a dilemma: Where shall the surplus labor force be stored? Within the factories, by compelling employers to hire more workers than they need? Within the government establishment which is already overstuffed with underutilized personnel? Within industry by the use of labor intensive techniques? In the urban ghettos and slums as "permanent visitors" of employed relatives? Or in traditional agriculture from which those with any education at all seek escape? The irony of this dilemma is that urban unemployment in newly developing countries is a consequence of modernization--a fallout of progress in lowering death rates, spreading education, investing in urban development, and building modern factories. Although he might wish that somehow or other the problem would "go away," the human resource development planner cannot escape responsibility for considering ways and means of absorbing surplus manpower and directing it into productive activities.

In short, industrialization provides little that may be useful in solving the growing unemployment problem. The only alternative then is to reform and modernize the agricultural sector so that the flow of manpower to the city may be slowed. Moreover, the failure of many development plans may be attributed to the failure of agriculture to meet its prescribed goals. A rural transformation is necessary for an industrial revolution.

Lack of Critical Skills

The evaluation of occupational needs and skill-generating capacity has been a traditional concern of manpower specialists. Here, unlike the situation with unemployment, it is possible to suggest viable solutions for rather clearly defined problems. Manpower requirements can be determined; appropriate programs of formal education and on-the-job training can be devised; and progress toward achievement of goals can be measured.

In setting targets for education and training programs, the analyst is concerned with three related but distinct concepts--"manpower requirements," "absorptive capacity," and "demand." "Manpower requirements" may be defined as minimum critical skill requirements by occupation. The assumption is that such skills are necessary, if not indispensable for achievement of a program of national development. "Absorptive capacity" is a looser term which refers to a country's capacity to provide some kind of useful employment for persons with certain educational qualifications. In effect, "manpower requirements" should express the minimum or essential needs; "absorptive capacity" should express the maximum number of persons who can be employed without encountering redundancy or serious underutilization of skill. The skill-generating centers, therefore, should produce trained manpower within the range between the maximum and the minimum; otherwise, the skill generation system is distorted or unbalanced.

"Demand" on the part of individuals to participate in education must be distinguished from the allowable range between manpower requirements and absorptive capacity. Demand stems from social and political pressures for various kinds of education as well as from the willingness of people to pay fees to acquire this education. Thus, for example, the demand for university education may be very high because of the status, prestige and pay enjoyed by graduates; but, in many countries this results in the production of graduates who cannot be effectively absorbed in the economy. Much of the discrepancy between demand and absorptive capacity is a result of the wage structure and wage differentials that have been held over from the neocolonial period. Based on this outmoded wage structure, demand for education may have very little relevance to the development needs of the country. The obvious solution is a change in wage differentials.

When demand is out of step with requirements or absorptive capacity, the country's educational system is clearly distorted or out of balance with the needs for national development. In using the systems analysis approach, a major task of the human resource planner is to detect actual and potential distortion and to consider measures for achieving a proper balance. The concept of a range between minimum needs and maximum capacity enables conceptualization of this distortion.

Another type of distortion in many countries is underdevelopment, if not outright neglect, of appropriate measures of training persons in employment. A great deal of money is wasted in formal pre-employment craft or technical training which could be provided more efficiently and cheaply by employing establishments. Also the efficiency of skill-generating systems could be greatly improved by closer linkages between schools and universities and the employing institutions. For some reason, education planners have been inclined to think that on-the-job development lies beyond their legitimate concern, and at the same time they appear to have ignored the task of building the necessary bridges between formal education and in-service training. The systems analysis approach tends to highlight this underdeveloped area of concern.

Institutional Inadequacies

In the past, manpower analysis has centered on measurement of needs for various categories of high-level manpower, and doing so it has usually overlooked the vital problem of organization and institution building. Successful development requires the building of effective government organizations, private enterprises, agricultural extension forces, research institutions, producer and consumer cooperatives, education systems, and a host of other institutions which mobilize and direct human energy into useful channels. Organization is a factor of production, separate from labor, high-level manpower, capital, or natural resources. The essence of organization is the coordinated effort of many persons toward common objectives. At the same time, the structure of organization is a hierarchy of superiors and subordinates in which the higher levels exercise authority over the lower levels. Without adequately functioning institutions, implementation of development objectives is impossible.

The successful leaders of organizations, or more accurately the "organization builders," are in any society a small, but aggressive minority committed to progress and change. They feed the aspirations, give expression to the goals, and shape the destinies of peoples. They play the principal roles on the stage of history, and they organize the march of the masses.

A major problem in many developing countries is "organizational power failures." Often government ministries, commercial and industrial organizations, or educational institutions simply fail "to deliver the goods." Usually, the trouble may be traced to a dearth of "prime movers of innovation."

Who then are these prime movers of innovation? Certainly the entrepreneur who perceives and exploits new business ventures belongs to this group, as does the manager or top administrator in public establishments. He may not always have new ideas of his own, but his function is to organize and stimulate the efforts of others. He structures organizations, and either infuses hierarchies with energy and vision or fetters them with chains of conformity. But effective organizations also need other creative people. The agronomist who discovers better means of cultivation, and the agricultural assistants who teach the farmers to use them, belong to the innovator class, as do public health officers, nurses and medical assistants. Engineers are in essence designers of change, and engineering technicians and supervisors put the changes to work. And last but not least, professors, teachers and administrators of educational institutions in many countries may constitute the largest group of prime movers of innovation, as they are the "seed-corn" from which new generations of manpower will grow.

Some innovators are "change-designers" who make new discoveries, suggest new methods of organization, and plan broad new strategies. Others are "change-pushers" who are able to persuade, coach and inspire people to put new ideas to work. Some innovators, of course, are at the same time change-designers and change-pushers. But whether they are designers, pushers, or a combination of the two, the prime movers of innovation must have extensive knowledge and experience. Thus, for the most part, they are drawn from the ranks of high-level manpower. But they need more than proven intelligence and thorough technical training. They should have, in addition, keen curiosity, a capacity for self-discipline, and an unquenchable desire for accomplishment. They should be adept at asking questions. They should have the knack of stimulating others to produce ideas and to activate the ablest minds about them; and they should be able to sell ideas to superiors, subordinates, and associates. The prime mover of innovation must be convinced that change can occur as a result of individual action, and he must have the drive within him to bring it about. This may stem from a desire to rise in social status, to build up material wealth, to acquire political influence, or to preserve an already established prestige position.

Many of the persons holding commanding positions in organizations are conformists or even obstructors of innovation. They must be systematically replaced by more creative innovators. The human resource development planner should be able to locate the critical points of power loss in organizational structures and to suggest remedies.

Incentives

A final major problem area in human resource development is incentives. It is one thing to estimate the needs for manpower of various qualifications but quite another to induce persons to prepare for and engage in occupations which are most vital for national growth. In most developing countries, it is incorrect to assume that relative earnings and status reflect the value of the contribution of individuals to development. Pay and status are often more related to tradition, colonial heritage, and political pressures than to productivity. Characteristically, for example, the rewards of subprofessional personnel and technicians are far from sufficient to attract the numbers needed; the pay of teachers is often inadequate; the differentials in compensation between the agricultural officer and agricultural assistant are too great; and the earnings of scientists and engineers, in comparison with administrative bureaucrats in government ministries, are too low. The preferences for urban living, the forces of tradition, and historical differentials all tend to distort the market for critical skills. It follows then that the demand for certain kinds of education, particularly at the university level, is inflated relative to the country's absorptive capacity. The human resource development planner must therefore consider deliberate measures to influence the allocation of manpower into high-priority activities and occupations and must incorporate modified incentive patterns into his forecast. Such measures may include major changes in the wage and salary structure, scholarship support for particular kinds of education and training, removal of barriers against upward mobility, and in some cases outright compulsion. As many developing countries have learned to their chagrin, investments in education can be wasted unless men and women have the will to prepare for and engage in those activities which are most critically needed for national development.

These then are the problems and tasks which face the human resource development planner--the consequences of population increases and the measures for controlling them; underemployment and unemployment in both the traditional and modern sectors; skill shortages and the processes of developing high-level manpower to overcome them; organizational weakness and the need to find prime movers of innovation for institutional development; and provision of both financial and non-financial incentives in order to direct critically needed manpower into productive channels. Some of these are subject to quantitative analysis; others are purely qualitative; and a few are subject only to intuitive judgment. But, they are all inter-related. The systems approach forces the analyst to look at them as a whole as he searches for the weak spots--the points of power failure or the major areas of distortion--in a country's overall effort to effectively develop and utilize its human resources.

This approach in reality is not new; it is little more than a logical framework for looking at problems which are almost blindingly obvious to those concerned with development problems. In order to illustrate this approach more concretely, I shall attempt to use it to sketch very briefly in rather broad strokes the critical elements in the utilization and development of human resources in modern Nigeria.

Human Resources in Nigeria

For a number of reasons, it is appropriate at this time to analyze Nigeria's system of development and utilization of human resources. The new government, which took over in January, 1966, is presently reviewing all aspects of human resource development in the country with the objective of formulating a national policy on education. It is now possible to review progress in manpower and educational development in the initial three years of the first six-year plan (1962-1968) and to estimate expected achievements by the end of the plan period. Finally, at the request of the new government, the country's principal economists and planners are already considering the guidelines for the second development plan (presumably running from 1968-1974), and there is every reason to believe that they will want to give serious attention to manpower and education problems.

Basic Problems

The "number one" manpower problem throughout Nigeria is rising unemployment, particularly in the urban areas of the southern regions. Despite the fairly high rate of economic growth achieved in 1965 (estimated at 5 percent of GNP), unemployment is rising, and its incidence is particularly high among school leavers who are unable to qualify for the limited available places in secondary schools. Even in the North, unemployment is becoming noticeable in the major urban areas. New factories and new commercial enterprises are providing jobs for only a tiny fraction of new entrants into the labor force, and they are not likely to absorb appreciable numbers of workers in the future.

A second problem is a shortage of critical skills. In the senior ranks, the categories in shortest supply are engineers, scientists, doctors, veterinarians, and agronomists. At the intermediate level, there are even more severe shortages of nearly all technical, **subprofessional,** and certified teaching personnel. There is also the usual shortage of senior craftsmen and technical foremen as well as higher-level secretarial and clerical personnel. Although admittedly the existing statistics published by the National Manpower Board are far from accurate, they do provide reasonable orders of magnitude which indicate that the country needs at least three persons in the subprofessional, technician, and teacher categories for every university graduate. Experts may differ as to the proper professional/subprofessional ratio. It may be one to six or it may be one to three. It is certainly not one to one-third, the present ratio in Nigeria. At best, the output of qualified personnel at the subprofessional level is less than half that required to meet the identified needs.

The total number of university graduates being produced is, if anything, ahead of target. Indeed, graduates in the arts, humanities, social sciences and law are already having difficulty in finding "appropriate" jobs. Increasingly, they must accept starting positions in the "executive" rather than the "administrative" level of government service. In the near future, the production of non-technical university graduates may exceed the economy's capacity to absorb them productively. But there is of course, a real shortage of scientific and technical graduates which is likely to continue for a long time.

Institutional and organizational inefficiency is another major problem. With the expansion in numbers of students, the quality of secondary education has declined. New industries are operating at low levels of efficiency. Government ministries, in some cases, have been so poorly organized and staffed that they have fallen behind in preparation of project proposals for external assistance. There is weakness at all levels in gathering of statistical data necessary for forward planning. These difficulties, of course, are characteristic of all newly developing countries. They may be traced in part to persistent shortages of qualified teachers, the dearth of subprofessional technical personnel in industry and agriculture, and the poor quality of executive personnel in virtually all of the civil services. Because of comparatively low pay scales and limited opportunity for advancement, relatively few people are willing to train for and seek employment in these intermediate occupational categories. Finally, in many cases, traditional bureaucrats rather than energetic innovators are still in command of private and government institutions, and they have a greater stake in tenure of office than in promotion of change.

As suggested earlier, the major manpower problems in Nigeria are almost blindingly obvious. They are quite similar to those of other developing African nations. To be sure, their quantitative dimensions have not been defined precisely. Detailed and more systematic studies would be useful, and in particular a sample labor force survey is urgently needed. This is already planned and underway. It is probable, however, that more reliable statistical information and more systematic surveys will simply confirm the gravity of the problems which have already been identified. In any case, the search for solutions should not wait upon additional statistical and factual information. The forward planner should proceed at once to examine the system of human resource development and utilization and to identify its basic structural weaknesses and major sources of power failure.

The Development of Formal Education

Education is Nigeria's biggest and most expensive industry. It accounts for about a fourth of all recurrent expenditures by governments. Its total employment is greater than that of all industry and commerce combined, and it requires the services of at least a third of the country's high-level manpower. Its function is to satisfy the aspirations of Nigerians for a better way of life, to produce needed skills, and to develop and extend knowledge for nation-building. An activity of this kind, which consumes so large a share of the nation's resources, should be operated efficiently and economically. But, in important respects, the criteria of efficiency and economy have been overlooked. In brief, the education industry in Nigeria is top heavy, structurally imbalanced, inadequately geared to the needs of the economy, and, at points, unnecessarily costly.

The spectacular development of Nigeria's universities is both a source of strength and a cause of distortion in the system of human resource development. The standards and quality of university-level education are admirably high. But, total costs per student, which exceed those in Great Britain or even the United States, are by any measure shockingly excessive. For example, the average annual recurrent cost per student is nearly $3,000, and the average faculty-to-student ratio in Nigerian universities is one-to-six. If the faculty-student ratio were increased to one-to-twelve (a figure approximately that in the better institutions in advanced countries), the number of students could be doubled without any increase in staff. But Nigeria has five universities with a total expected enrollment by 1968 of about 10,000 students. There are duplicating and competing faculties. An inordinate amount of money is spent on boarding facilities which are wastefully utilized. Each institution is much too small to take advantage of economies of scale. Already this very costly university system is beginning to turn out more non-technical graduates than the country really needs, whereas it fails to produce enough scientists, engineers, and doctors primarily because the secondary schools are unable to provide enough students with adequate mathematical and scientific background.

The overemphasis on university education, moreover, distorts the development of secondary and even primary education. For practical purposes, Nigeria has a "single axis" system of education. The underlying objective of the curriculum and teaching in secondary schools is preparation for the universities. The school program is oriented toward the small minority of students who will be "successful" in gaining access to the universities, and it puts little emphasis on education for the majority of "unsuccessful" students who fail to make the grade. To be sure there are many teacher-training institutions at the secondary level, but very few technical and vocational schools.

A major bostering force of the single axis system in secondary education is the sixth form--two years of post-high school college preparatory education. To the extent that it is a prerequisite for university entry, the sixth form tends to mold the curriculum, teaching, values, and goals of secondary education in the single axis tradition. Of equal importance, the sixth form raises the prestige of secondary schools which can offer it. Indeed, the proponents of the sixth form argue that it is necessary to raise the levels and improve the quality of secondary education--i.e., to gear secondary education even more closely to university preparation. Fortunately, however, the role of the sixth form is now being seriously questioned. The universities are finding that their selection is better if they admit qualified fourth form leavers to a "concessional" year of preparation for university level work. In effect, the one-year concessional study at the university is a substitute for two years' work in a secondary sixth form, and the quality of teaching, particularly in the sciences and mathematics (where the need is greatest) is likely to be much better.

Actually, most education specialists in Nigeria are now aware of the distorting role of the sixth form and agree that major changes are required. Some would eliminate it entirely in favor of the concessional preparatory year in universities, advanced teacher training colleges, or higher technical institutes. Others would retain it but broaden its role to provide a terminal education in addition to university preparation. This would be tantamount to turning the sixth forms into "junior colleges" which would be equipped to produce technicians and other subprofessional personnel as well as candidates for university-level work. In either case, the major objective is to create a multi-axis system of secondary and higher education.

Most Nigerians are also aware of the need for broadening the secondary school curriculum at the lower levels as well. The idea of the so-called "comprehensive high school" is taking hold in both the Eastern and Western Regions. Education planners throughout the country are now fairly strong advocates of "multi-lateralization" of the curriculum by introducing some pre-vocational scientific and manual training in all secondary schools. Indeed, a high official in the Western Region has already predicted that within five years all secondary schools will be of the comprehensive or multi-lateral type.

The human resource development planner, therefore, can easily identify the structural defect of the single-axis program of secondary education, and he can also note with assurance that most of the country's education experts hope to remedy the situation. But the costs of these obvious reforms, both in terms of equipped and the training and upgrading of teacher salaries, are likely to be very high. Here research is urgently needed.

The structural defects in the design of secondary education and the relative overemphasis on university development explain in part the underdevelopment of subprofessional and technical personnel in the so-called intermediate high-level manpower categories. University graduates in Nigeria have enjoyed very high status and pay, and thus, secondary school leavers who are qualified for higher education press for entry into the universities rather than the intermediate technical or teacher training institutions. Under these conditions, the expansion of post-secondary training facilities for technicians, agricultural assistants, medical technicians, nurses, and certified teachers is likely to be frustrated. The intermediate institutions simply do not have sufficient drawing power for students in competition with the universities. And, indeed, the students which they do attract are likely to contrive in one way or another to gain access later to the universities For this reason, there is strong pressure for intermediate institutions to transform themselves into universities. Manpower statistics which dramatically demonstrate the acute shortages of subprofessional and technical personnel are not likely to change this situation.

Possible Solutions

How then can the lack of generating capacity at this level be corrected? One solution may be to allow the universities to overproduce graduates thus forcing those who cannot get senior posts in industry or government to accept employment as technicians and teachers. In time, this will lower the expected earnings of university graduates and make university level education relatively less attractive. But this method obviously is both costly and wasteful. Another more direct solution would be to narrow the differentials in starting pay between university graduates and subprofessional personnel. Actually, the pay and status of graduates, particularly in the government service, is based more upon a colonial tradition than upon productivity or strategic usefulness in the economy. For example, there is no economic reason why university graduates who hold lower level administrative positions in a government bureaucracy should be paid more than technicians, trained school teachers, or agricultural extension workers whose services are urgently needed and highly productive. There are, of course, formidable political and administrative roadblocks in the way of this solution. Another solution might be to assign to the universities the task of training at the subprofessional level. This would mean that universities would accept fourth form leavers (at the "0" level) both for a "concessional" year of preparation for university level work and for shorter terminal subprofessional courses. In this case, the universities could control placement in accordance with aptitude and ability. The great advantage here would be the possibility of lowering the high per student costs in the universities by increasing student enrollment and thus capturing economies of scale. Almost certainly, this solution would be less costly than building new and separate institutions for post-secondary intermediate education and training.

The human resource development planner cannot expect to come up with a clear and logical solution for this dilemma. In practice, all three of the solutions suggested above are likely to be tried in part and in combination. The power deficiency may be remedied somehow by a mixture of "muddling through" and concerted corrective measures. And indeed, part of the deficiency may be overcome by more effective integration of formal education with training programs for employed manpower.

The Generation of Skills of Employed Manpower

In Nigeria, there are sizeable power losses in human resource development which result from ineffective "bridging" between the system of formal education and the country's employing institutions. Both pre-employment education and continuous in-service training are essential elements in any system of human resource development, and the two need to be effectively articulated.

As in other African countries, there appears to be a general shortage of craftsmen and well-trained artisans. Some have received training in the large expatriate enterprises such as the United African Company and the Shell-BP petroleum enterprises. Such training is limited, however, for expatriates merely develop skilled manpower for their own use. Once the skilled manpower is available, the training staffs leave the country. Often, sadly enough, the departure of these vital personnel is condoned by host governments who would rather not have expatriates training the indigenous population. Most persons in the craftsmen and well-trained artisans category learn their trade on the job. Many emerge from the indigenous apprenticeship system and others gain experience by working on construction jobs. Only a handful are the products of pre-employment trade centers and vocational schools. In fact, only 2 or 3 percent of all those enrolled in the secondary school system attend vocational schools, and many of those attending vocational school fail to enter a trade or craft.

It is generally assumed in Nigeria that craft training in formal vocational schools should be expanded. Yet, training of this kind is extremely expensive; qualified teachers are hard to find; and the effective demand by employers for the "graduates" is uncertain. Unfortunately, there has never been a basic study of the structure of demand for craftsmen and the effectiveness of the various processes which produce them, but there is now growing interest in a new systematic approach to the problem--the "Skapski Program," so called because of the imaginative, dynamic, and persistent efforts of its originator.

The Skapski Program

In essence, the Skapski program has a four-prong strategy. It calls first for several prevocational courses as part of the curriculum of all secondary schools in order to make all students more "trainable" on the job or in more advanced technical training programs. The second prong is the development of a small number of high-level trade schools to produce senior craftsmen. Completion of prevocational training coupled with several years of general education would be required for admission to those schools which in many cases would become divisions of "comprehensive high schools." The third prong would be massive technical assistance for improving the day-to-day operation of indigenous apprenticeship and training activities of small employers. And the final prong would be maximum utilization of the facilities of the large, expatriate firms to train a wide variety of skilled workers.

If adopted, the Skapski program would remedy the most serious deficiencies in the existing system of craft skill development, and it would head off the proliferation of costly trade centers and lower level vocational schools which have proven to be very ineffective and wasteful in most developing countries.

At the higher manpower levels, there are serious deficiencies in the "bridging" between the universities and the employing institutions. For example, applied research and extension in fields such as agriculture are carried on in government institutions which are separate from the university. Usually there is very little communication between the two. Greater integration of the teaching, research and service activities could result in better utilization of scarce personnel, better training of university students, and far more productive research. Although progress is being made in this area, Nigeria's universities in many cases are still quite removed in their ivory towers from the main stream of development activities. To a lesser extent, a similar situation prevails in public administration and management staff training for employed manpower.

Most manpower analysts would agree that the Nigerian universities are operating much below their potential capacity for generating the kinds of skills required in Nigeria. They need to expand greatly their extension, **extramural,** research, and service activities. They should devote more of their resources to upgrading the skills and knowledge of presently employed high-level manpower in both the public and the private sector. And they should extend their spheres of influence downward and outward by assuming more of the burden of education of subprofessional technical and teaching personnel. Through better bridging of this kind, the social returns on the fabulously high investments in university education could be quite significantly increased.

The Unemployment Dilemma

Up to this point, we have concentrated on measures to improve the skill generating capacity of the system of human resource development. For the most part, we find here that there are logical and feasible solutions for rather clearly defined problems. But, much more formidable obstacles are encountered in dealing with the utilization of manpower. As previously stressed, rising unemployment and persistent underemployment are Nigeria's most intractable and serious manpower problems. This manpower problem is characterized by expanding industrialization, a GNP growth rate of five percent per annum, but little or no increase in employment. The "pull" of urban areas and the "push" from rural areas has led to considerable flows of persons who can only swell the ranks of the unemployed. All this at a time when agricultural output is falling behind increases in population. Although planners and government leaders are alarmed at these tendencies, they are at a loss to find any appropriate solutions.

As yet, there have been no comprehensive studies of unemployment in Nigeria but there are widely held beliefs about its compostiton, causes, and consequences. In the urban areas, the growing army of unemployed is thought to consist mostly of primary school leavers. They migrate to the cities in search of jobs, further education, or training which will enable them to find employment. Presumably they live with relatives or friends who are willing to "take them in." Because wages are comparatively high, those who find jobs are reasonably well off, and their success encourages droves of less fortunate persons to remain in the cities with the hope ultimately of finding employment or educational opportunities. The urban unemployed also include older, unskilled persons as well as youngsters whose families have been city dwellers for some time. Job opportunities are limited because the rate of expansion in government employment has been curtailed for plausible reasons of economy and because the new factories using modern equipment absorb relatively little labor. There remains petty trade, handicrafts, and services which are virtually choked with underemployed labor. In these activities, there is probably as much or more disguised unemployment as in the rural areas.

Solutions Considered

The creation of more jobs in the urban areas will not solve the problem of unemployment, because it simply induces a more than offsetting increase in the urban labor force. Let us examine some measures which, though occasionally tried by some unwitting governments are clearly destined to fail. The first is to require factories to employ more workers than needed and to restrict their right to reduce working forces as productivity expands. Holding the labor reserve within the factory gates in this way accomplishes nothing. It reduces productivity and at the same time generates a swollen labor force. Alternatively, attempts might be made, as advocated by some economists, to reduce wages in the major government services, factories and commercial enterprises. This would have the dual effect of lowering labor costs, thereby reducing the pressure to substitute machinery for men, and dampening somewhat the attractiveness of urban life to potential in-migrants. This solution, however, must be rejected on practical political grounds. Civil servants, well-paid factory workers and trade unionists--all in position to wield great political power--simply would not tolerate it.

Another device, suggested by the ILO, would be for governments themselves to employ, and through taxes and subsidies induce private enterprise to hire "more labor than it would be worthwhile to employ on the basis of a comparison between productivity and wages." This might be appropriate, according to its advocates, as long as the newly employed workers have a net productivity above zero so that their employment adds to total current output. But, in essence, this would simply be substitution of work relief for direct relief. It would do nothing to ease the pressures for expansion of the labor force. Indeed, a modified version of this tactic was tried in Kenya in 1964. Here a major effort was made to wipe out unemployment under a "tripartite agreement" whereby the government, private employers and the trade unions agreed that all major employing institutions would increase their employment by 15 percent. In this case, the unions also agreed to forego their demand for general wage increases. The effort was a colossal failure. The private employers did take on additional workers, and this acted like a magnet attracting new workers into the urban labor markets. The government, which faced financial stringencies, simply could not afford to pay for additional workers and thus failed to carry out its part of the agreement. In a few months the working forces in most of the private establishments had dropped to their former levels through attrition not offset by new hires. In the end, the volume of unemployment, as a consequence of the expansion of the labor force in response to the prospect of more jobs, was increased very substantially. And with the collapse of the whole arrangement, the unions naturally resumed pressure for wage increases.

A technique which is often suggested is the introduction of labor-intensive production methods. While appealing, this suggestion is useless unless wages are reduced. Previous arguments against lowering wages apply with equal force in this instance.

Finally, attempts to make it easier for surplus labor to remain in the cities are also doomed to failure. For example, government unemployment insurance may simply create a larger army of unemployed than could exist under the private unemployment security system of support by relatives and friends. Investment in more and better housing for labor makes it possible for more in-migrants to swell the ranks of the urban unemployed. The same may be true even of measures to improve health and sanitation, although these, of course, could be justified on other social grounds.

Arthur Lewis comes much closer to hard realities when he argues that the best remedy would be to prevent wages in the modern sector from moving out of line with incomes in the traditional sector. In general, he says, wages in the modern sector should be kept at about 50 percent above the farmer's income, and excess profits of enterprises should go not to the workers but as a rent element to the state. In this way, governments could promote capital formation and finance public services They could reduce differentials in earnings of labor by investing these funds primarily in agriculture and rural development. Lewis admits that this policy would be anathema to trade unions and some governments, and concludes that in the end political forces will determine the outcome.

Making Rural Existance Attractive

But Lewis, although on the right track, overstresses the wage argument and makes his solution politically more difficult by so doing. Essentially, the key to solution of the unemployment problem is an increase of earnings in the agricultural sector and making rural existence more attractive, particularly for school leavers. The idea of holding wages down in the modern sector is not as palatable politically as increasing investment in the rural sector. In other words, unemployment in the modern sector may best be alleviated by rural transformation which keeps the labor surplus on the land

and provides some productive employment for it at the same time. Indeed, in most newly developing countries, this is the road to productive industrialization as well.

In many modernising societies, agriculture is the most underdeveloped sector of the economy. It is characterized by poor use of land, primitive technology, and difficult access to markets. Yields per acre are low, and incomes in real terms are barely at a subsistence level. As a consequence, most of the newly developing countries, where the bulk of the population still lives in rural areas, must import food. Thus, the development of agriculture, livestock, fishing and related activities can be justified as a measure to save precious foreign exchange, and the raising of real incomes is the best way to provide markets for industrial products. Rural development, therefore, can and must contribute to national production and development. And of all forms of development, rural development is the most labor intensive and has the greatest capacity for absorption of relatively unskilled labor.

The requirements for a comprehensive program of rural modernization are not modest. New kinds of organizations and institutions are needed, and these require large inputs of high-level manpower. Some decentralization of political and economic decision-making is necessary. And, in most cases the effort will require the diversion of financial resources generated in the modern sectors for development of the agricultural sector. In Nigeria all three of these basic requirements run counter to past development policy if not counter to the interests of powerful political forces as well.

For rural modernization the following organizations and institutions are essential: agricultural research institutions for food as well as export crops; extension services in all major agricultural areas; marketing cooperatives; rural development banks; organizations to develop and manage land reclamation and irrigation systems; community development organizations; primary, secondary and technical schools; institutions for adult education; health clinics with outreach services; and strengthened local government in rural villages. These all require quite large numbers of subprofessional personnel such as agricultural and veterinary assistants, medical technicians, extension workers willing to live close to the farmers, teachers, village community development workers, rural credit and marketing cooperative managers, and so forth.

In Nigeria, however, these occupations command low status and pay compared to higher-level occupations in government, industry and commerce in the large cities. Education in the rural areas has an academic bias which is oriented to the needs of urban centers. Thus, the effect of expansion of education is to drain the best brains from the rural areas, making it difficult to find and hold the kinds of people needed to staff rural organizations and institutions. The solution here may be to raise the salaries and increase the perquisites of subprofessional manpower needed to spearhead rural development. One could argue that the incomes of skilled workers in rural areas should be at least equal to if not higher than the starting salaries of university graduates in government service in the capital cities, and there should be ladders of promotion leading to positions of high pay and status in the rural areas. Typically, however, nearly all high-paying positions are in the capital cities which destroys the incentives for creative people to make a lifework of living in the bush. Without a major adjustment in wage and salary structure of high-level manpower in favor of rural occupations, however, the building of the necessary organizations and institutions for rural modernization will be impossible.

A final requirement is adequate investment in rural development. To some extent the necessary resources can come from the rural areas themselves. Experience has shown that rural inhabitants are willing to devote resources, either in labor or in taxes, for projects from which they derive clear benefits. Thus, in many countries, local villagers will cooperate under proper leadership to construct schools, dig wells, and build local access roads. They will improve land and cultivate it more intensively if they are assured the major share of increased output. Indeed, as Wolfgang Stolper has argued on several occasions, people are willing to tax themselves for what they think are wise expenditures. Thus, the amount of taxes, either in the form of produce, money, or labor which can and should be raised depends upon the efficiency of their utilization. Rural areas in most developing countries can support a substantial amount of development, provided that they are not taxed to finance urban development as well.

In many countries, however, urban development and industrialization is financed by taxes of one kind or another on rural production. In Nigeria, for example, a substantial proportion of the income for development of the modern sectors comes from the agricultural marketing boards which purchase products such as palm oil, cocoa, and groundnuts and sell them at a profit in foreign markets. The accumulation of funds for development in this way is justifiable, provided that they are used for rural development rather than simply for construction of government buildings, luxury apartments, public services, and other such projects in the modern sectors. Certainly, it is unrealistic to treat agriculture as a major source of revenue for investment in industrialization and urban development and at the same time expect more private investment of time and resources in agriculture. The rural areas cannot provide the surplus funds for investment if they are starved. On the contrary, as Lewis suggests, some of the profits generated in the industrial sector should be siphoned off for rural development. This can be achieved in many ways. Development funds can be diverted from city streets to rural access roads. Credits can be made available for agricultural development instead of for the building of city apartments. Funds can be allocated to training of agricultural and veterinary assistants instead of to proliferation of television stations. And priority can be given to improvement of housing and living conditions through rural community development rather than to urban construction and slum clearance. Such a policy will encounter strong political obstacles, since the urban groups are in many cases the most vocal and politically powerful elements in the society. Yet, rising urban unemployment and the repeated failure of the agricultural sector to meet the targets set in development plans may produce some changes in attitudes over time.

To summarize, the major goal of a strategy to alleviate unemployment lies in rural modernization. A rural transformation will absorb surplus labor more effectively than a modern industrial revolution. Both, however, can and should take place simultaneously. But human resource development planners should not assume that rural modernization alone will eliminate unemployment or underemployment; it can only alleviate the problem and keep it from festering in the urban areas. Any country with a high rate of population increase is likely to encounter visible and hidden unemployment in all sectors of the economy unless it can achieve a rate of economic growth which unfortunately is beyond the capacity of nearly all newly developing countries. This proposition is being examined in another paper by the author.

Conclusion

By using a systems analysis approach, the problems of development and utilization of human resources in Nigeria can be examined in logical perspective. They fall into two major categories: (1) Shortages--skill and knowledge generation, and (2) Surpluses--unemployment and underemployment.

The first set of problems can be solved by making some changes in the design and performance of institutions providing various kinds of education and training, as well as by providing more effective bridges between them and the country's employing institutions. Our conclusion here is that Nigeria's system of human resource development should be better balanced and more effectively geared to the country's occupational needs for national development. Nigeria is already devoting a very large proportion of its resources to education--indeed, probably too large a proportion. The national interest would be served best by improving the efficiency of the existing system of skill and knowledge generation before allocating additional resources for its expansion.

The second set of problems, i.e., those related to utilization of surplus labor, are much more difficult to handle. Unemployment and underemployment cannot be eliminated by tinkering with educational institutions and training programs, or by establishment of a youth corps. They can be alleviated by a major change in national development objectives which would give very high priority to a program of rural transformation. Nigeria wants to increase national income and at the same time provide employment opportunities for its masses. But unfortunately, the two goals are not completely consistent. In order to satisfy employment objectives, it may be necessary to accept somewhat slower growth in national income. The human resource development planner is obligated to pose this dilemma, as well as to spotlight the stark reality that a substantial amount of unemployment and underemployment is an almost inevitable consequence of high rates of population growth.

The systems analysis approach used in this paper does not suggest that the more traditional manpower surveys are outmoded. On the contrary, it assumes that they must be made in order to arrive at a first approximation of manpower requirements. The systems approach, however, does go beyond traditional manpower requirements analysis by examining operational relationships between a broad range of factors involved in human resource development. It forces the analyst to take a broad view of education planning and to examine its relationship to an even broader area of in-service development of skills and knowledge. It stresses the identification of causes of power failure and structural faults in design of skill generating institutions. It is a way of looking at elements as functional parts of an overall constellation. It is, in effect, an attempt to apply the principals of "balanced growth" to the field of human resource development.

The use of this approach may lead us to question some of the concepts and slogans which often were employed in the past. Let me conclude by mentioning a few of them.

First, there is the notion that all developing countries should increase the proportion of their resources devoted to education. Actually, there is no clear-cut causal relationship between the volume of investment in education and successful national development. Indeed, under some circumstances, education of the wrong kind may impede growth. And poorly balanced educational systems can and do waste resources which could be used more productively for other purposes.

Second, there is the idea that human resource development planning should be integrated with and subordinated to economic development planning. To be sure, manpower requirements can be derived in some cases from sectoral growth plans. But manpower considerations--such as unemployment--may necessitate major changes in emphasis and orientation of the entire program for economic development. It is, therefore, often just as logical in national planning to start with a broad plan or strategy of development and utilization of human resources than to begin with a plan to maximize economic growth. In other words, we might consider whether economic planning should be integrated with human resource planning rather than vice versa.

Finally, we should question the widely held belief that aid to the developing countries for human resource development is always beneficial. For example, some kinds of external aid for development of secondary and university education can seriously distort skill-generating systems. More often, the ultimate cost consequences of pilot or demonstration projects financed by well-meaning donors are overlooked, thus committing the recipient countries to programs which they cannot afford. And some programs of student fellowships and exchanges may cause a major drain of precious brainpower from the less developed to the more advanced countries.

The urgent need in the human resources area is for comprehensive planning based upon an integrated examination of all major constituent elements. This suggests a human resource generalist rather than a manpower specialist. If this comprehensive approach is sound, systems analysis can make a significant contribution.

DISCUSSION

Question from the floor

You seem to have discarded the human resource strategy concept in the system analysis. Can you comment?

I am pleased to note emphasis being given to incentive and wage structure. Has there been any **fallout** from the African experience which can substantiate this additional emphasis?

Comment by **Mr.** Harbison

A systems analysis is quite similar to a human resources development strategy, as it focuses on the elements necessary to build a strategy. The human resources **strategy** implies a plan and a method of implementation whereas the systems approach centers more on the planning aspects of resources development.

Charles Meyers and I have long been concerned with the importance of wage structures and incentive patterns, but the added emphasis in the system analysis reflects the growing discrepancy between output of training facilities and absorptive capacity. In the early stages of development almost all skills were in short supply and output was quickly absorbed. Now bottlenecks are beginning to appear and the return on educational expenditures has fallen quite low in several categories.

The problem is to get people into the bush where they are needed, but this cannot be accomplished unless the pay and perquisites of the critical occupations compare more favorably with higher prestige positions.

Incentives also assume great significance in relation to unemployment. The necessity of slowing in-migration to the cities is obvious. A modified wage and incentive structure is the most efficient means of keeping manpower in rural areas.

Question from the floor

Being familiar with the education system in Nigeria, it appears to me that initially no attempt was made to translate the overall manpower requirements of the development plan into goals which could be used to direct the education and training system. Can you comment on this?

Comment by **Mr.** Harbison

The educational system has improved considerably since its inception. Multilateral or multi-axis schools have been introduced to replace single-axis secondary schools and are having some success. This important modification may change the entire educational structure over time. Most important, manpower requirements were taken into consideration in this transformation, reflecting a growing awareness of manpower forecasting.

Question from the floor

But the educational system has not yet reflected the needs for manpower in agriculture.

Comment by **Mr.** Harbison

To be sure, not all aspects of the education system have been successful.

It appears that too many people in the developed countries assume sophisticated planning organizations exist and that all suggestions can be immediately implemented. This is simply not the case. Organizational and institutional problems abound and are further complicated by political ineffectiveness. For example, there are four distinct governmental units in Nigeria and thus no central educational policy. Furthermore, it is politically infeasible to have a population census. In such a framework, one cannot expect rapid implementation of policy, especially when viable institutions do not exist. Moreover, while university enrollment targets have been met, the needs for subprofessional and technical manpower have been virtually ignored because subprofessional education and training have no political "sex appeal."

Were I to do the Ashley Report again, I would minimize the importance of university education and concentrate on overall manpower needs. Once again, the systems analysis approach forces consideration of political and institutional problems and possible means of circumventing such difficulties.

Question from the floor

It seems that the systems analysis merely illustrates the differences between the role of executive and advisor in the development mission. The role of the manpower specialist is to suggest what should be done and the cost of **not** doing it. It is then the role of another person (the executive) to meet other difficulties which may arise and to implement the **advisor's findings.**

Comment by **Mr.** Harbison

I agree in principle, but not in practice. For example, the manpower advisor may suggest the need for a labor force survey. Approaching human resource allocation at this level can provide valuable information but it limits the scope of analysis and neglects vital contingencies.

A systems analysis is a much broader analysis, involving consideration of the ramifications of policy suggestions. If the manpower planner can attack manpower problems on this broad basis, taking account of the implications of his suggestions, your dual approach may be correct. It is not correct, however, unless an overview of the development process is undertaken first.

In connection with this analysis, let me suggest that some of the worst impediments to development arise out of the actions of the purveyors of aid.

Nigeria again illustrates this difficulty. Lack of coordination between donors and in fact competition among donors has led to duplication of facilities and misallocation of resources. Regional pride, prestige, and political power are important aspects of this problem, but the essential factor is the inability to project and foresee the constellation of contingent difficulties which various policy actions imply. Manpower assessments should be made without consideration of educational requirements.

Question from the floor

Your presentation focuses primarily on formal aspects of education, while it seems more of a systems approach to consider the continuum of education: formal schooling, vocational training, and employment itself. As most people obtain the bulk of their skills through employment, it appears that you have left out a large segment of human resource development.

Comment by Mr. Harbison

If I neglected this aspect of the problem, I certainly did not mean to. More than one-half of all training is in-service training; the most neglected aspect of manpower development.

A manpower plan should indicate:

1. Where skills are obtained and,

2. the time-span involved in acquiring these skills since we are dealing with an on-going problem.

PART IV: PANEL DISCUSSION

Panel Members:
Frederick H. Harbison, Chairman
Russell Davis
Harold Goldstein
Morris Horowitz

Comment by Mr. Davis

I have worked in a great many areas within the manpower development, training, and education field. While I am not from the "manpower discipline" so to speak, there were a few things **discussed** today which I would like to comment on.

The first relates to the use of economic or manpower targets as a basis for education and training. The character varies depending on the level at which the planning problem is viewed. The "global" manpower setting includes all occupations, which are then translated into education and training equivalencies at the national planning level. The tables presented by Morris Horowitz, Manuel Zymelman, and his colleagues, seem to me to be very useful in accomplishing these goals. They will help in avoiding some real gross mistakes at the national level. Such studies will become less useful in future years because I think that, increasingly, less gross mistakes are being made.

We are working at a very different level, however, in Ciudad, Guayana. There we would not use these kinds of figures. This city, which will become one of the largest heavy industry complexes in Latin America, in another ten or fifteen years, has been the basis for concentrated planning activities. Here we have very detailed feasibility studies providing good estimates of future market activity and of future investment since the regional development corporation has the resources and has the control over investment. Here we do not base our estimates on studies by economists or by manpower planners, but we bring in engineers who do studies providing us with the specific kinds of occupations which will be required and the related training activities. Where they have had difficulties was in estimating the related manpower needs in light industry and in services, particularly government services. Here, for example, the initial estimates for the year 1975 for such municipal services as policemen and firemen came from using a composition pattern from the city of Nashville.

My point is that the needs and purposes of forecasting manpower requirements are different depending on the point or level from which you are looking at the planning. This is especially true in my case where we are primarily interested in the data as a guide for educational and training programs which are to be implemented. Countries, too, differ in their needs for these forecasts and the kinds of analysis that should be applied.

Question from the floor

Do you believe that the engineers who made the estimates of occupational requirements in Ciudad Guayana felt confident about their forecasts? And do you have confidence in these estimates?

Comment by Mr. Davis

Yes, I feel they are reasonably good. An engineer has a good idea of what investment will be and what the effective market will be, he has some notion of capacity and the kind of technology which will change, of course, but within this fairly solid framework, we could make reasonably good estimates as to what the specific occupational needs will be, especially since we have a lot of flexibility between education and occupational requirements, I think it falls out reasonably well.

Question from the floor

What was the ratio of training costs to capital investment?

Comment by Mr. Davis

I do not know exactly what these ratios would be since we have a **nonclosed** population. We do not assume that all of the training is going to be done either by the industries or even by the public sector. Obviously with such a heavy internal migration and the selective recruitment of persons already trained, no ratio could be determined except in the steel mill, agriculture, and some other very specific areas. It is interesting to note that with persistent levels of high unemployment in the area, it is still necessary to bring in certain skilled workmen for specific tasks, especially in construction.

Question from the floor

Which institutions shared in providing the education and training that was estimated in your studies?

Comment by Mr. Davis

There is first of all a public education system which has vocational training at the secondary level. This system will accept part of the burden of the education and training that is needed. In addition, there is INCE which is the National Institute for Educational Cooperation which is a national training program with a large training center. It too will accept part of the burden, especially of the short-term training courses of six months or thereabouts. It is running into difficulty since basic literacy is often needed before skill training can be given. The large firms are assuming a reasonably extensive training burden including an in-plant training program under French assistance in the steel mill.

There **is,** in fact, all kinds of training, some on the job, some in schools, and some in actual training institutes.

Question from the floor

Can the vivid contrast between the current rapid development in Venezuela and the present stagnation in Argentina be explained at all in education or manpower terms?

Comment by Mr. Davis

Argentina is an almost inexplicable case. They have passed through a "take off" period and they now are on a plateau. They attribute this to social and political instability. They still have one of the best educational systems in Latin America. It demonstrates that you can have a highly-developed educational system and without basic social and political stability, growth will not occur.

Comment by **Mr.** Horowitz

I would agree with Dr. Davis on the level of the educational system in Argentina. They have a high literacy rate and a large proportion completing at least the sixth grade level.

Comment by Mr. Davis

Venezuela, on the other hand, appears more hopeful but they must make the right decisions. People there are living in the hope that things will be better. If the Guayana project is successful, it will produce some 7 percent of the total **gross national product,** it will represent some 20 percent of the industrial product, and 20 percent of export earnings. While the potential is tremendous, as yet, nothing is operating at full capacity.

The actual differences and experiences of these two countries, I do not think can really, be explained by any of the so-called manpower or education theories.

Question from the floor

It seems to me that a good part of the quantitative approach to manpower requirements forecasting emphasizes occupations and industries where measurement is easier but it does not always include some of the occupations and economic activities which are crucial to development. This would include agriculture and I am not thinking in terms of the people who are going to be in extension work or agricultural research or those on big commercial farms but instead the ordinary farmer. The other categories I would include are: 1) entrepreneurs (in this case, not managers) and 2) managers and administrators. It is difficult to categorize these with regard to occupational definition and particularly with regard to educational and training requirements.

Comment by Mr. Goldstein

You start out by trying to answer the questions put before you by the policy problems existing in a country. Policy problems having to do with how many schools should be established or how many people should be trained. When you find yourself with such a policy problem as how many people should be trained as entrepreneurs, it is a little hard to come to grips with it, because there is no body of training that is designed to turn out persons in the category. An entrepreneur in a shoe repair shop has a different kind of training than another who is in a steel mill.

There is a need to get this kind of information for the kind of problems that exist in agriculture. Agriculture can, of course, be left to continue as it has always done with the only education that is introduced in the field of basic literacy, and training given by some extension services or county agents. In this educational and training context, there is no particular demand for educational projections of the number of people who have to be trained for agricultural work.

I think it is for these reasons that less attention has been paid to estimating the requirements for the occupations which you have mentioned.

Comment by **Mr.** Horowitz

In many of the developing countries, at least as I have seen it in Latin America, the question is not so much training of farmers as it is the more professional occupations in the agricultural sector: i.e., agronomists or agricultural engineers. Here there are certain statistics available and more and more of the universities are attempting to graduate persons skilled in these professions. The problem, however, is that when these people leave the schools, they do not want to leave the urban areas for the agricultural ones where they are most urgently needed. The need is there, and we do try to make estimates as to the magnitude of these requirements, and how they can be educated. The real question seems to be utilization once the education process has been completed.

Comment by **Mr.** Harbison

The easiest area in which forecasts can be made is the industrial sector because you have fairly large units to work with. It can be reasonably argued now, however, that agriculture is an area where considerable expansion must take place. The requirements for agronomists, extension workers and other professional and technical categories in agriculture can be projected on the basis of available jobs or on what governments are planning at the present time. It will generally be found, however, that there are not very many such positions. On the other hand, if this need were projected on the basis of some anticipated rate of increasing annual agricultural output, it would yield very different results. Probably, there will be movements in this direction. In the area of projections, therefore, perhaps one of the things that needs to be done is to offer alternative estimates of manpower needs on the basis of different levels of performance in the economy, demonstrating the manpower requirements necessary to achieve differing goals. We can be certain that the development objectives of the countries are going to change and these changes need to be anticipated by exploring such ranges or alternatives.

Comment by **Mr.** Horowitz

Within the context of our study, it is possible for a country to view the experience of another included in our tables and estimate what its own needs may be. If, however, the country anticipates no change in the productivity or development of its agricultural sector, our tables of course will be of little use in furnishing any guidelines.

Comment by Mr. Davis

One of the problem areas in agriculture is the question of incentives. The individual farmer, or the student of agricultural methods, may not be able to get possession of needed land. And, there is no tradition of hiring them as technical service people. But more than incentives, there is also the question of social value attached to the sector. Low status keeps people out, at the technical and subprofessional level.

The area of entrepreneurship has largely been left unstudied due to more pressing problems in other areas absorbing the research funds and the time of the students in the field. There is a need for studies of the motivation and the education of persons engaged in this area.

Question from the floor

If you were able to return the urban surplus labor to the farms, in developing countries, would you not really be just exporting the unemployment back to the farms? In most cases there is not sufficient land available, and in agriculture, more than in some other sectors, there are opportunities for rapid increases in productivity through the application of new methods, new technology, etc.

Comment by **Mr.** Harbison

In the first **place,** I do not believe that people will be willing to return to the land. Perhaps the objective is to slow down the urban migration from the farms. Secondly, a more productive agriculture creates income in the rural areas which one would expect to create employment, or at least to overcome the contraction of employment, in tertiary activities. This would occur as modern rural communities are developed along with developments in agriculture. As agriculture becomes more productive, you are attenuating one of the strongest incentives for urban migration.

It is possible to modernize agriculture and to increase output but still retain large numbers of people on the land. There are many countries, however, which still have large areas of available land which could absorb many more people if they could be induced to go there. And in Nigeria, for example, one of the difficulties is that agricultural output, even in some of the export crops, is decreasing due to labor shortages.

Comment by Mr. Davis

We are finding in our studies of urban migration in the developing countries, that it is not really job opportunies and wage differentials that are attracting people but it is the total lack of amenities, services and meaningfulness in their life. In Latin America, for example, urbanization may not be a measure of development or of increasing productivity in the agricultural sector but in fact a movement generated by wholly noneconomic forces.

Comment by Mr. Goldstein

Returning to the specific consideration of manpower forecasting, we have explored today a variety of techniques. I should like to try now to tie together some of the areas we have been discussing. Dr. Harbison has pointed out that we must look at manpower planning and development as part of a system--a system which includes forecasting, feedback, incentives, relationships between population and economic growth, etc. One very small part of this systems analysis then is the forecasting of the manpower needs, either universally or for specific sectors. Within this specific area, I have suggested that you must, among other things, project industry manpower requirements, and from these you must project occupational requirements. One simple way of translating these industrial requirements to occupations is the use of industry-occupation patterns. It is in this area that Dr. Horowitz and his associates have made their major contribution. They have developed these industry-occupation composition patterns for countries at different levels of development and have analyzed the changes that occur in occupational structures by industry in the process of development.

We have not been looking, therefore, at contrasting or rival approaches to manpower forecasting but instead we have been exploring complementary approaches all of which form part of a whole system.

Comment by Mr. Davis

I would like to suggest a further value of manpower forecasting in some developing countries. This is as a psychological factor, stimulating interest in generating resources and developing their manpower. By relating education and training to economic activity, we have been able to get resources which were never available when education was looked at as merely social overhead.

Comment by **Mr.** Horowitz

I agree that we have not shown there to be any clash or conflict in the forecasting techniques for manpower requirements. With the techniques that have been discussed, I feel that an underdeveloped country has some flexibility in choosing a methodology in line with its particular needs.

Question from the floor

Agriculture is an area which will see a great deal of expansion in the immediate future. The implications for manpower forecasting are very different whether one is considering only the requirements for trained persons or whether the entire industry is to be considered and also whether it is a country which has abundant, unpopulated land or if it has a land scarcity. In general, however, increased productivity in agriculture is going to mean more output with less labor. Haven't we the problem therefore, of projecting productivity in agriculture in terms of targets? My actual question is, in terms of the increasing importance of agriculture and the complications inherent in its economic and social structure, shouldn't a great deal more emphasis be given the kinds of projection techniques that can be applied in this area?

Comment by **Mr.** Harbison

It seems to me that we have gone a long way in finding out what the manpower needs are going to be for various types of industry, particularly if they are going to use modern technology. Perhaps the most important area remaining where we need manpower projecting and forecasting is in the agricultural sector.

We are dealing with a field, however, where we are not absolutely certain what the impact of changing productivity will be. It may be that we will increase productivity in the rural sector without decreasing labor requirements. In addition, the **composition** of output is changing as we are moving to foodstuffs of higher quality, the implications of which are not fully known. Hence, with changing quality in output, with expanding communities, with improvements needed in highways, etc., labor requirements may in fact be increasing.

In addition, we know that as bad as the opportunities are for absorbing more people in agriculture, they are worse in the other sectors. I think, therefore, that we need to spend a lot more time and energy in forecasting such things as the additional needs for farmers, the educational and training needs of these farmers, etc., because this is the area where most of the manpower is, and unless some way is found of keeping them there, we are going to have a very difficult time.

Comment by Mr. Davis

The area of manpower forecasting in agriculture has been largely neglected. In fact, it is most often treated as a residual. My experience has shown, however, that it is much more than merely investigating agriculture as a sector of the economy. It is the whole problem of the rural interior of a country. This includes marketing, credit, transportation, etc.

Question from the floor

I would agree in that the major part of the increased productivity in agriculture does not occur on the farm but in the related technology and services in the rural sector. If we were to only investigate this from the farm end, it would be self-defeating. In addition, we have no choice but to accept modern agricultural techniques if we are to feed the growing populations of these countries. Where there are still open areas, we must go in with modern agriculture and all of the amenities of life in order to attract people into these areas.

What we need to do in the beginning is to determine the "kind" of agriculture which we want, and this will probably lead us to give a great deal of emphasis to the education and training of people in the sectors allied to agriculture.

Comment by **Mr.** Horowitz

We are talking now about problems and solutions to problems which will in fact be determined by people in their own country. We can only help them after they have determined the kind of solution they are after and the goals and targets they set for themselves. At this point, we can be of assistance in quantifying or forecasting the manpower requirements involved in these goals.

Comment by **Mr.** Harbison

I agree that we can only offer our services in those areas where we are called upon by the developing countries to make them available. We should, however, be sufficiently farsighted to investigate what their problems are going to be five or ten years from now so that when they begin to ask us about these problems, we will be ready to help them.

PART V: FORECASTING EDUCATIONAL NEEDS FOR ECONOMIC AND SOCIAL DEVELOPMENT

Herbert Parnes

Discussant: Robinson Hollister

Planning Requires Forecasts

At a symposium at the University of Wisconsin, which I attended last year, the title of which was "Data Requirements for Manpower Forecasting," approximately half of the participants took the position that manpower forecasts were impossible and a few went so far as to say that even if they were possible, they ought not to be made anyway. In the light of that experience, it seems advisable to begin by saying a few words about this fundamental issue.

In the context of general economic planning, manpower planning, or educational planning, there is really no point in raising the question of whether the estimation of future manpower requirements is feasible. The planning process requires some judgments, or at least some assumptions, about the shape of the future manpower structure. Whether or not these are made explicit, judgments must be made. For example, it would be the height of irresponsibility for an economic planner to suggest the establishment of a national airline in a developing country without raising the question whether there would be pilots or navigators to man the aircraft. Similarly, in the case of educational planning, so long as one grants the relevance of education to vocational preparation, it is clear that any rational decisions with respect to educational policy must take into account future manpower requirements of the economy. It seems to follow that if one is to have planning in any of these areas, there must be some process for arriving at judgments with respect to future manpower structures. This is all one needs to mean by manpower forecasting.

Forecasting Methods Depend on Circumstances

It is futile to juxtapose various methods of making manpower forecasts with the objective of ascertaining the "best" approach. For one thing, the appropriate approach to manpower forecasting is governed to a certain degree by the categories of manpower for which estimates are to be made. One would ordinarily not use the same techniques for estimating future requirements for policemen, teachers or medical doctors as would be used for engineers. The "approach" that one takes is also linked inexorably to the purpose which the forecasts are to serve. For instance, if forecasts are to be used primarily for planning short-term training or retraining programs, the Area Skill Survey approach seems to be clearly appropriate. On the other hand, if the purpose is development of a long-term educational plan, it would be nonsense to put much reliance on forecasts by individual employers, especially in a developing country where one hopes industries will develop that are not yet in existence. The method of forecasting that one uses frequently depends on the characteristics of the country for which the forecast is to be made. For example, however useful the international comparisons suggested by Dr. Horowitz and his colleagues may be for less advanced countries, they obviously are of little value for the United States. Still another reason why it does not seem very useful to choose a "best" method of forecasting in the abstract is that the forecaster in a developing economy is almost invariably the victim of woefully limited data. Consequently, almost all such work in developing countries proceeds on a "catch-as-catch-can" basis with whatever methods available data permit. Finally, far more important than the "approach" is the qualified judgment and knowledge the forecaster has to apply. Irrespective of the techniques, all of us realize that forecasting is an art and that common sense and sound judgment play the crucial role.

Two Kinds of Forecasts

Another issue is the several senses in which the term "manpower forecasting" has been used. A distinction needs to be drawn between an unconditional prediction of future manpower structures and an estimate of the manpower structure necessary if specified economic and social goals are to be achieved. The term forecasting has been used in both of these senses, but there is tremendous difference between them. In the latter sense, the manpower forecaster does not purport to make a prediction with respect to the future, but merely attempts to explore the implications of certain economic and social goals. It is an "if--then" kind of analysis: if you are going to have an airline, then you need pilots and navigators. This point is important for two reasons: first, it is much easier to make the latter kind of forecast than the former. Second, it is the latter type of forecasting, happily, that is generally most relevant for developing countries, particularly where economic planning exists.

The Mediterranean Regional Project

Let me now turn to the Mediterranean Regional Project. It is important to keep in mind the context in which "manpower forecasts" were made in the MRP. This was an exercise in long-term educational planning with the goal of developing for each of the six participating countries (Greece, Italy, Portugal, Spain, Turkey, and Yugoslavia) a fifteen-year educational plan that would reflect their "needs" for education in light of their economic and social development goals. It was recognized at the outset that economic development in these countries would imply a change in manpower structure. It was also recognized that an important function of an educational system is to prepare people for the world of work. Consequently, one of the criteria for planning the educational system was the country's anticipated manpower needs. It was in this context that the so-called "manpower forecasts" were made. They were one of the starting points for the development of an educational plan. Needless to say, criteria other than manpower were also used, but I shall not deal with them here.

To outline briefly what was done in the MRP, each of the countries estimated the occupational structure required by its output targets for 1975. The required occupational structure of the labor force for 1975 was then converted into the "required" structure of the labor force by educational qualification. Then, by comparing the required qualification structure in 1975 with the existing qualification structure, the necessary net increase in each of the educational qualification categories was ascertained. By taking into account losses due to deaths, retirements, failures to enter the labor force, etc., gross "outputs" required from each of the levels and branches of the educational system were computed. These estimates of required numbers of graduates were then used to calculate required enrollments over the 15-year planning period, making allowance for expected attrition. On the basis of these enrollment estimates, requirements for teachers and for plant and equipment were calculated. Finally, estimated costs--both capital and current--were calculated, and a 15-year educational budget developed.

Different Methods Used for Estimating Future Manpower Structure

Anyone who has even superficially reviewed the six country reports of the Mediterranean Regional Project will realize that no uniform method of manpower forecasting was used. This is why it is quite inappropriate, it seems to me, to refer to an "OECD" or an "MRP" approach to manpower planning. Let me illustrate. First of all, diverse institutional environments in the six countries necessitated variations in the approach of the forecasters. In three of the countries, well-developed central planning organizations existed, while in the remaining countries there was no development plan which could be used as a basis for the manpower forecasts. In these cases the MRP planners had to postulate a set of overall economic objectives from which manpower requirements could be deduced. Secondly, there were wide variations in the specific forecasting techniques used. For example, the occupational classification system in terms of which manpower requirements were calculated varied considerably in degree of detail, ranging from four categories in the case of Yugoslavia to 61 in the case of Greece. The countries also used different methods for estimating the future occupational structure of each industry. Greece placed heavy reliance on intranational comparisons--comparing the manpower structure in the modern firms in a given industry with that of less-advanced firms--on the assumption that during the planning period the productivity of the less-advanced firms would rise and their occupational structure more closely approximate that of advanced firms. Spain used both intranational and international comparisons. Yugoslavia extrapolated past trends, but modified the resulting estimates on the basis of intranational comparisons, international comparisons, and informed judgment.

Certainly, then there was never an "MRP Approach." The national teams employed a variety of techniques to arrive at their best possible judgment about future manpower structure.

Basic Rationale Underlying All the Forecasts

Despite this eclectic approach, all the specific techniques were based on the assumption that a fundamental set of relationships underlie all long-term manpower forecasts. These are the relationships that may be presumed to exist between the character of technology, the level of productivity, and the manpower structure in an industry. Certainly the MRP was not distinctive in employing this assumption; it is implicit in the method of forecasting Harold Goldstein described for the United States and explicit in the "international comparison method" Morris Horowitz and his associates described. I should point out that all manpower forecasters have been criticized by some economists precisely for the use of this set of relationships. Their objection is to the assumption of fixed production coefficients or, in the terms of Mary Jean Bowman, "*ex ante* near-zero skill substituabilities." I do not believe that any manpower forecaster fails to realize the possibility of skill substitution--that you can, for example, produce textiles in a variety of ways, from cottage production with hand looms to factory production with automated equipment. What the manpower forecaster *does* assume, however, is that once productivity goals are established, these imply within narrow limits the technology that must be used and hence the required manpower structure. Admittedly this is only an assumption, but one which the Northeastern University study validates to some extent. I might suggest, however, that rather than continuing such studies of the relation between productivity and the occupational structure on an international basis, it might be preferable to proceed on an intranational comparative basis. This would involve comparison of firms in the same industry and in a given country but with different levels of technology and productivity. Confining data to a given country would eliminate some of the problems that have been identified as plaguing international comparisons: cultural differences, differences in classification systems, and problems arising from the use of exchange rates to convert productivity measures to a common basis.

AN EVALUATION OF METHODOLOGY

Robinson Hollister

Let me begin by describing briefly some work which I did with the OECD in technically evaluating the Mediterranean Regional Project (*Planning Education For Manpower Needs*, OECD 1966). Essentially, the work consisted of an evaluation of some of the arguments that have been raised against the manpower requirements approach in light of some real data. The MRP was the first project in the application of manpower requirements forecasting in a thorough manner to the problems of educational planning. It was useful, I believe, to perform this evaluation both for the purposes of the project and as a means of indicating the state of the art in making manpower projections. I tried to use the data from the project to test some of the hypotheses that had been put forward as criticisms of the manpower requirements approach. I did this in a very simple manner by applying sensitivity analysis to the results to determine the importance of the various assumptions in the final projections. To the extent that historical data could be drawn from the MRP project, a similar analysis was made of the historical data as well as on the projections. This was to determine whether sensitivity to particular assumptions was just a **peculiarity** of the projections or whether the same kinds of problems were found in the historical data.

There were three major areas to which I directed my studies. They were: 1) The importance of occupational substitution, 2) The role played by technological change, and 3) The link between the occupational structure and educational requirements.

The Importance of Occupational Substitution

With respect to the substitution question, first, occupational coefficients were compared among four of the countries in the MRP--it was in only these four that we could make the occupational data at all comparable. It was found that the occupational input per unit of output--the occupational coefficients being measured in this way rather than as a percentage of the labor force--varied considerably among countries. This, it was concluded, was evidence that, although other factors were also considered, occupational substitution could to some extent have caused the variance in occupational coefficients.

We then tried to construct a range of substitution from some of the data from the base year--in this case 1960--and to apply this range of substitution to the end year--1975--projections in order to get some indication of what difference it would make in the results if this range of substitution were in fact correct. This was done, holding the level of productivity of labor between countries in each sector constant, or as constant as we could, and varying the level of skill composition at that level of labor productivity as reflected in the 1960 data for each of these four countries. For example, in a given sector such as agriculture, we used two countries with identical or, at least, as close as possible levels of productivity. We then compared the occupational structure for each country. To isolate the possible substitution effect, we measured the differences in these occupational distributions used at a similar level of productivity and applied this difference to the final projections.

We found that when this range was applied to the projections, it made a major difference in the outcome. In the case of Spain, for example, the range of substitution allowed for a 20 percent change in the requirements for higher education and a 10 percent change in secondary general education, offset somewhat by a change in the opposite direction in secondary technical education. This suggested that if this illustrative range of substitution had any value at all, which may be the case, large differences in the final projections could result, even at constant levels of labor productivity.

The Role of Technological Change

In examining the question of technological change, our investigation covered the following four areas: 1) gross national product, 2) the sectorial distribution of GNP, 3) labor productivity in each sector, and 4) occupational structure in each industrial sector. These are essentially the elements that are combined to obtain the occupational distribution of the labor force. We took the projections and some of the historical data from the MRP and attempted to distribute the total required occupational change among parts attributable to each of these four elements. In other words, how much of the measured change needed in an occupation was related to the changing level of GNP, to the changing sectorial distribution of GNP, to changing labor productivity in each sector and finally to changes in the percentage distribution of occupations in each sector. It was found that two of these four factors dominated changes in the occupational distribution of the labor force over the period of the projections and, similarly, in the historical data. These two were the level of GNP and the labor productivity assumption. Hence, if there were small errors in the estimates of the change in GNP or of the change in productivity, they would serve to wipe out entirely any careful and accurate estimates of the distribution of gross national product among sectors or changes in the percentage distribution of occupations within a sector. In other words, estimates of the change in the level of GNP and technological change are really the assumptions to which the whole forecast of changing occupational distributions are sensitive. We know very little about technological change, in this case measured by the productivity of labor, and all the literature with which I am familiar indicates that we are not likely to be very effective in predicting how productivity will change over a 15-year period in various sectors.

The Relationship Between Occupations and Educational Requirements

With respect to the linkage between occupational structure and educational requirements, we attempted to analyze the projections for one of the countries to see what role was played by changes in the level of education associated with each occupation in determining the total change in educational requirements over the period of the plan. Assumptions were made regarding the changes in the level of education associated with an occupation over time--assumptions had to be made in this case since really nothing is known about the education associated with any occupation or how and why it changes. In the case of one projection we analyzed, we found that these assumptions were extremely important; approximately 50 percent of the total change in educational requirements was a result of assumptions made about changes in educational requirements associated with each occupation. This, of course, does not mean that the assumptions were wrong. It only serves to indicate the great impact that these assumptions have on the final determination. An additional implication is that if 50 percent of the results are always going to be determined by the education-occupation relationship, of which we know very little, we must ask whether it is really worth it to go through all of the strain and pain of estimating occupational change, since it does not play the key role in the final outcome.

We also did a similar analysis of historical data for Italy, and found that change in education for each occupation was much less than it was in the projections. However, there is some data available for the United States which shows that, historically, changes in education associated with occupations have played a larger role in change in the stock of labor force education than have the changes in the occupation distribution. This was again demonstrated in an evaluation of Japanese data.

These, then, were the major illustrations arising from our studies demonstrating the sensitivity of the entire manpower requirements exercise to the various assumptions.

Returning to the Issue of Substitution and Labor Productivity

I want now to return to the questions of substitution and labor productivity. It seems to me rather curious that manpower planners have been willing to proceed in this two-stage fashion in estimating occupational needs. Essentially, that is, beginning by getting labor productivity in each sector and then, secondly, finding the distribution of occupations within the sector. What this has really amounted to is an assumption that the objective for the economy is to be stated in terms of the labor productivity objectives in each sector, but it does not seem to me in general that this is a reasonable assumption. Actually, the objective is to obtain the pattern and level of output set in the development plan. The objective of the manpower requirements forecaster, it seems to me, is to relate the human capital involved to these output targets and to seek a way to obtain that level of output at a minimum of cost (or at a given human capital cost level to maximize the output that is attainable).

It is particularly curious that we have been willing, to date, to proceed in the two-stage fashion because the whole rationale of the manpower requirements approach is that the historical economic approach regarding labor as a homogeneous commodity is erroneous and overlooks important relationships. Yet, in effect, what we have done, and this is particularly true in the MRP, is to accept the development planners' approach to the whole problem. We allow the planner to set the level of labor productivity in each sector, taking that as given, and then we derive the occupational structure from that. Why we allow this false dichotomy to continue is not clear to me. It seems to me what we should be concerned with is the direct relationship between each occupational group and a particular level of output and not the percentage occupational distribution within each sector. I think that there are two quite different reasons for putting some emphasis on the importance of discarding our central concern with total sectoral labor productivity as a variable in and of itself. First, as I have suggested, it limits the range of choice that the manpower requirements man has open to him. Why must he accept the level of labor productivity as given and as a limit? What is wanted is, in fact, the level of output in that sector at the minimum cost by varying capital and the various types of labor.

The other reason for getting away from this emphasis on labor productivity is some statistical problems (spurious correlations) in relating labor productivity to the percentage distribution of occupations by sector which can lead to erroneous conclusions.

My final suggestion is that a much more flexible approach be taken in the area of the forecasting of manpower requirements. While the projections are being made, it is well to analyze continually the sensitivity of projections to the assumptions which are made, thereby giving guidance in identifving key assumptions. Careful investigation and refinement of such assumptions is the task toward which energies should be directed.

Question from the floor

Concerning the influence of substitution between occupations, is this of greater consequence in developed countries than in the developing countries? If so, are two completely different approaches needed in allowing for this in the forecasting process?

Comment by Mr. Hollister

To the extent that a new structure is being built up in the country and you have less existing capital investment, you have a wider range of choice of substitution in these countries because you can only change the average capital structure in a developed country very slowly and you therefore have only a small margin to work with. Where the margin is larger, as in a less developed country, you can probably make substitution more readily.

Question from the floor

When you were speaking of substituting one set of occupational coefficients for another set at a given level of productivity, please tell me what in this case is being substituted for what?

Comment by Mr. Hollister

In one case, we were looking at the occupational coefficients to find out the number of persons in a given occupation in a given sector per unit of output. These were then compared among countries. The second thing which was done was to measure occupational substitution using the differences in the occupational distribution--the percentage distribution of occupations in a sector--between countries, holding the overall level of labor productivity constant, but allowing the percentage distribution within that sector to change.

Comment by Mr. Parnes

Would you not agree, Dr. Hollister, that step number one of the above two is really quite irrelevant--one would expect to find differences in occupational coefficients between countries whose productivity levels vary considerably. This does not constitute, it seems to me, a criticism of the assumption that where productivity is given, the manpower structure is definable in terms of that level of productivity.

Comment by Mr. Hollister

I would indeed agree. I was merely suggesting that there is some evidence for substitutability. My second argument would be that I do not see the need for taking the level of productivity as the fixed thing with which we have to work. Since our basic concern is to obtain a given level of output at a minimum cost, it seems to me we need not take the productivity of labor as given; total labor productivity is really an artificial concept left over from the time when people did not view the labor input as disaggregated. If we accept the idea of disaggregating labor into its various levels, then we should throw away the reliance on total labor productivity.

Comment by Mr. Parnes

This then seems to be an argument for integrating manpower planning with overall economic planning and that economic planning must reflect manpower considerations.

Question from the floor

Essentially, what you are arguing then is that we have to consider the relative prices of the various productive factors? Training and education will, however, alter the relative prices of these factors.

Comment by Mr. Hollister

No, I was not arguing that you must consider factor prices directly. I am not recommending the usual rate of return analysis. I would avoid the problem of trying to estimate marginal factor product directly. The costs I am speaking of are education and training costs. Different occupational structures will represent different training costs. If you have a certain amount of flexibility and choice, then you can determine the minimum training costs for a given level of output actually by altering your assumptions of labor productivity and the occupational structure.

Question from the floor

Are you assuming that occupational development is derived completely from institutional programs of education and training? How can you measure education and training costs, therefore, if you assume that a great deal of occupational training comes from other sources?

Comment by Mr. Hollister

No, I do not assume this at all. If you were able to include informal training costs, it would be much better. Unfortunately, we now know too little about what expenditures are made for training outside the formal training institutions. I believe, however, that enough is known about the costs of formal education and training that at least this portion of total training costs can be calculated. If and when sufficient information is available on the informal costs of training, I would certainly recommend that it be included.

PART VI: THE MANPOWER SKILL SURVEY AND LABOR AREA DEMAND ANALYSIS

Vladimir D. Chavrid

Discussant: Fletcher Wellemeyer

History

Although some information on occupational forecasts for local areas has been available in this country for the past 25 years or more, it is only recently that this aspect of the Department of Labor's job market information program has received a significant impetus. Much of this renewed emphasis comes from such manpower legislation as the Area Redevelopment Act, the Manpower Development and Training Act and the Vocational Education Act in which the Department is specifically charged with the responsibility of providing occupational forecast information for specific local areas. For example, Section 103 of the Manpower Development and Training Act reads as follows:

> "The Secretary of Labor shall develop, compile and make available, in such manner as he deems appropriate, information regarding skill requirements, occupational outlook, job opportunities, labor supply in various skills, and employment trends on a National, State, area, or other appropriate basis which shall be used in the educational, training, counseling, and placement activities performed under this Act."

And from Section 202 of the same Act:

> "Before selecting a person for training, the Secretary (of Labor) shall determine that there is a reasonable expectation of employment in the occupation for which the person is to be trained."

By restricting training activities carried out under this Act to occupations for which future demand can be demonstrated, the need for valid forecast data for specific occupations becomes immediately apparent.

Similar responsibilities are delegated to the Department of Labor under the Vocational Education Act which reads in part:

> "...Provides for entering into cooperative arrangements with the system of public employment offices in the State...looking toward such offices making available to the State Board and local educational agencies occupational information regarding reasonable prospects of employment in the community and elsewhere..."

The main source of current and anticipated occupational data for specific labor areas is the area manpower skill survey and its abbreviated counterpart, the training needs survey. The skill survey is the basic occupational document for a community, providing an appraisal of trends in the occupations selected for study. Such a survey is important for at least two reasons. First, it results in a useful product; a publication which analyzes the occupational needs of the community. Second, preparation of the survey initiates a process that continues after the survey itself has been completed, namely, the cooperative effort which evolves as employers, educators, labor unions, government agencies, and various citizen's groups are brought together in an attempt to assess the occupational needs of the community. The final document becomes a concrete guide for manpower planning while the cooperative relationships established in the process become an important factor in implementing the recommendations of the survey.

Although forecasting occupational needs for specific labor areas has become increasingly important in the United States in recent years, this aspect of the job market information program of the Department of Labor was initiated prior to the entrance of this country in World War II. At this time, attempts were made to collect information, primarily from defense-oriented industries, on labor demand. These demand estimates were then compared with estimates of labor supply to determine the extent of worker in-migration necessary to establish a proper balance between demand and supply. The purpose of this forecast was primarily to insure availability of housing for workers who would be entering the area.

Following this initial period of research, labor demand and supply information was used to channel defense contracts to areas with adequate supplies of labor. This was the beginning of the Area Labor Market Report which regularly analyzes the labor conditions in various areas throughout the country. The program has been improved and expanded over the years with the exception of a brief period prior to the Korean conflict. The area reporting program is currently operating in 150 of the largest labor areas in the country as well as many of the smaller ones. In addition, approximately 500 newsletters dealing with local employment trends are published each month for various labor areas.

While this program provides valid and useful data by industry and area, it does not provide detailed current or projected occupational information. A growing awareness that labor scarcity and labor surplus could exist side-by-side emphasized the need for occupational data and led to the development of the area skill survey. For example, presently there are from 1.2 to 1.5 million unfilled job vacancies **concomitant** with unemployment of 3 million. This imbalance between labor supply and occupational demand illustrates the need for detailed information and perhaps training programs. The area skill survey was originally no more than an extension of data on individual areas to meet occupational problems. The first such survey was made in York, Pennsylvania during the Korean conflict, a period of widespread labor shortages. The end of hostilities and a reduction in the budget forestalled further development of the skill survey program. Moreover, as the country moved into a period of labor surplus, the program became temporarily dormant.

The second impetus to the program came under the direction of Secretary of Labor James Mitchell who, because of his strong interest in the importance of a properly trained work force, instituted a "Skills of the Workforce" program. The area skill survey was reinstituted as part of this program. The "Skills of the Workforce" program became very popular and was made a part of the Department of Labor's overall job market information program. Since this period in the late 1950s, a total of more than 150 area skill surveys have been published by 44 of the State employment services while 40 surveys are presently in process or in the planning stage.

With the enactment of important legislation such as the Area Redevelopment Act of 1961 with its provisions for occupational training, the Manpower Development and Training Act of 1962 which deals with both research and training, and the Vocational Education Act of 1963, even more emphasis has been placed upon the need for occupational forecasts in the training of various work groups. In addition, current labor stringencies make the need for these surveys even more important. Secretary of Labor W. Willard Wirtz and President Lyndon B. Johnson are most concerned about the present imbalances which exist between the occupational needs of employers and the supply of workers available to meet these needs. As the President noted in the 1966 Manpower Report of the President:

> "...We must make a special effort to see that our human resources are not wasted. We must accelerate the growth of public and private training programs and make them available to all. We must bring jobs to workers and workers to jobs. We must eliminate the discrimination which wastes our manpower resources. Our goal is not just a job for every worker. Our goal is to place every worker in a job where he utilizes his full productive potential for his own and for society's benefit. No society can be truly great--and no economy can be truly prosperous--if high, long-duration unemployment for some exists side by side with low, short-term unemployment for others. Special programs, suited to special groups, are needed to achieve full employment with price stability."

Looking to the Future

In the future, the area skill survey program in this country will place more emphasis on forecasting job opportunities for the disadvantaged than it has previously. Since many of these job opportunities will be in occupations which are relatively simple to learn, it may be difficult to estimate the labor supply available when the length of training required is no more than a few days. Activity measures based upon the number of unfilled openings on file with the employment service and the percent of these openings which are difficult to fill (defined as being unfilled 30 days or longer) may be an appropriate measure of labor shortages. This emphasis on relatively simple occupations may have implications for estimating labor needs in countries faced with the problem of developing skills in population segments which correspond in some respects to our disadvantaged groups.

In the future, we plan to conduct our manpower studies on the basis of an annual program approach in which broad national guidelines and program objectives for training activities are forwarded to State agencies for use in developing individual State plans. This will represent an improvement over the present approach where determination of the labor areas and occupations to be surveyed is on more of a random basis.

The Bureaus of Employment Security and Labor Statistics are presently involved in a cooperative effort to develop a BLS-BES Guidebook for use in long-range occupational forecasting. Part I of the Guidebook will consist of the BLS occupation-by-industry employment matrix for 1960. By adjusting this model for changes in industry employment and occupational mix over time, it will be possible to obtain forecasts of industry and occupational demand. Work is also underway on initial projections to 1970 and 1975 of occupational ratios for detailed industries. The limitations of this approach are that an aggregate model is used and the model only projects labor demand, not supply. Part II of the Guidebook will be prepared by the Bureau of Employment Security and will outline the procedures and techniques for making State and local area manpower projections using the national data provided by BLS in Part I.

A number of additional elements are needed to strengthen the Bureau of Employment Security's long-range local occupational job market information program. These would include such things as:

1. A current benchmark or inventory of employment by occupation for each of the country's 150 major labor areas. The regular collection of these data, perhaps every two years, would provide the necessary base from which local long-range forecasts could be made.

2. A detailed analysis for each of the 150 major labor areas of long-range occupational requirements (2 or 5 years) in relation to probable supply. These data should be prepared locally and should include data from local employer forecasts and from national projections. The proposed BES-BLS cooperative effort should assist in improving the forecasts made under this phase of the program.

3. Techniques for keeping data current. To keep abreast of occupational changes in the local employment structure, use should be made of operating data already available in the public employment offices such as information on job openings and of new programs such as job vacancy surveys.

4. Utilization of occupational demand and supply data in the preparation of material for use in counseling and guidance.

5. Additional occupational job market research. This includes improved techniques for measuring the impact of technology on industrial and occupational structures and for obtaining and evaluating supply data by occupation in local areas. Also needed is more precise information on the impact of geographical and occupational mobility.

6. A planned follow-up program to appraise employer forecasts and verify the effectiveness of area skill surveys in meeting local needs.

Methodology of an Area Skills Survey

As might be expected, the first step in a manpower skill survey is to select the occupations to be studied. Because of the time and expense involved in conducting a skill survey, no attempt is made to survey all of the occupations in an area. Instead, a list is compiled of between 50 and 150 occupations which represent the surplus and shortage occupations in the area, in which large numbers of workers are employed, and in which demand is expected to increase in the future. In many cases, the occupations selected require at least a year of training, but below the college level. These occupations include semiprofessional, technical, skilled, clerical, and service groups.

Next, because information on labor demand in the skill survey approach is supplied by local employers, a sample of employers must be selected. Generally, this sample will consist of all of the largest firms in the area and a specified proportion of the smaller firms. The data reported by employers is statistically inflated to represent the needs of all employers in the area in the occupations studied.

The basic information collected from each surveyed employer is:

1. Current employment and anticipated employment in 2 and 5 years for each surveyed occupation and total employment in the establishment.

2. Number of workers replaced yearly in each occupation surveyed as the result of promotion, retirement, death, disability, withdrawal for military service, etc.

3. Number of workers completing in-plant training in 2 and 5 years for each surveyed occupation.

The second and equally important aspect of an area skill survey involves the estimation of the labor supply which will become available in the surveyed occupations during the succeeding 2 and 5 years. These supply estimates are compared with the estimates of labor demand provided by employers for each occupation in order to measure net labor needs in the labor areas. Part of the information on labor supply is provided by the data on in-plant trainees expected in 2 and 5 years. These data are then supplemented by estimates of the number of new workers who will be entering the surveyed occupations over the forecast period from such sources as public and vocational schools, private and parochial schools, business schools, apprenticeship organizations, trade unions, and various training courses set up under such legislation as the Manpower Development and Training Act. Supply estimates are further supplemented by an evaluation of occupational characteristics of unemployed workers currently registered at the public employment service.

Methodology of a Training Needs Survey

While skill surveys are the basic source of actual and forecast occupational data for the community, they are expensive and time-consuming to conduct. The responsibility of the Department of Labor under the MDTA (supra) led to a modification of the area skill survey approach. This modification resulted in the training needs survey technique which provides area forecasts of occupational needs and supply quickly and at a relatively low cost. Even after the modification, however, the training needs surveys and the area skill surveys are similar in many respects. Local employers are contacted and requested to furnish information, by occupation, on their future needs, their replacement needs, and the number of in-plant trainees over the forecast period. In addition, however, employers are also requested to provide data on the number of current vacancies in the surveyed occupations. Estimates of labor supply, prepared in the same manner as in an area skill survey, are compared with the estimates of labor demand so as to arrive at some measures of the net occupational needs of the community. Unlike the area skill survey, however, only a few occupations are included in any one training needs survey. In addition, a much shorter forecast period (1 and 2 years) is used. Furthermore, there is no attempt to survey a scientific sample of employers and the number of employers contacted is much smaller than is the case with the skill survey. Because scientific sampling procedures are not followed in these studies, the data developed can not be inflated to the universe. However, the data do indicate whether there are shortages or unmet needs in the occupations studied and this information is sufficient for justifying a proposal to initiate a training program. To date, over 3,000 training needs surveys have been completed.

Applications

Area skill surveys have had many applications in the United States. Survey data have been most useful in areas of labor stringency where it is necessary to determine the extent of existing occupational shortages so that appropriate recruitment or training programs may be established. Skill surveys have also been useful in areas of substantial unemployment by indicating the occupations and industries where unemployment persists. This information is important in identifying where long-range planning of industrial development and skill retraining programs are needed in order to make more efficient use of the local labor force. The surveys are also useful in identifying occupations for which workers are needed despite overall unemployment in the area.

While the area skill survey approach was not designed to meet the specific requirements contained in the Vocational Education Act, the data from the surveys have proved useful in implementation of the Act. Even prior to this legislation, area skill surveys stimulated apprenticeship programs and guided the formulation of school training curricula and industry training programs. In 1962, the Georgia State employment security agency conducted such a survey involving 155 occupations. The Vocational Education Division of the State participated in the survey and used the results to determine the curricula for vocational-technical schools and as a basis for an expansion in the number of schools. Similarly, the North Carolina employment security agency conducted a skill survey in cooperation with the State Board of Education which was seeking assistance in determining training needs for the State. The results of the skill survey provided the educational authorities with guidelines which could be used in planning curricula for expanded vocational education programs to meet the needs of North Carolina employers. Data from the skill survey were also incorporated into a companion study prepared by the North Carolina State Board of Education concerning the development of industrial education centers throughout the State.

There have been many applications of the data from skill surveys in this country in addition to the uses already noted. The data are very important in counseling and guidance since sound vocational decisions must be based not only upon worker aptitudes and qualifications but also upon information about employment opportunities in different occupations. Information about the industries and establishments which employ workers in specific occupations is a useful guide in developing opportunities for job seekers. By providing a better understanding of each employer's occupational needs and how they fit into job opportunities in the community, the data improve the contributions of public employment services to local employers. The community benefits from a skill survey, for information on local manpower resources, including the occupational qualifications of employed and unemployed workers, has important implications for the economic expansion and development of the area. The area skill survey provides a point of departure for the development of specific data needed for civil defense and mobilization activities. Information on the occupational composition of the labor force of individual labor areas is an important tool for identifying the sources of the types of workers that may be needed for civil defense emergency activities, while in times of mobilization, facts about local occupational labor demand and supply are essential for manpower program purposes.

The area skill surveys provide a valuable supplement to many other tools of occupational analysis which are presently available, for example, the Department of Labor's experimental job vacancy program now completing its second year of successful research, and the Dictionary of Occupational Titles, prepared by the United States Employment Service. This recently revised publication furnishes definitions and codes for almost 22,000 separate occupations and is not only an important source of occupational information but is the primary tool available for classifying occupations in the United States and other countries. Other occupational analysis tools used in conjunction with the area skills survey are the occupational guide program which provides an analysis of the job opportunities in specific occupations, the Job Guide for Young Workers, etc.

In general, the area skill survey program has been well received. Typical of the comments made relating to the program are those of Professor E. Wight Bakke who pointed out that even with their shortcomings, the area skill surveys remain the primary source of information on anticipated labor demand and supply for specific occupations in specific labor areas.

Improvement of the Department of Labor's skill survey technique is an area of continuing research. A study was recently completed by John Fletcher Wellemeyer and Associates to evaluate the usefulness of the skill surveys conducted in two areas, as well as to verify the stability of the occupational forecasts developed by the two State employment services. Mr. Wellemeyer found occupational projections developed in both areas accurate enough to be useful in the planning of training programs. He recommended that area skill surveys be conducted regularly, at two-year intervals in the surveyed areas.

In the coming year, we plan to explore various methods of compiling current occupational employment information and to improve our long-range projection techniques. For current employment by occupation, we will look into such information as that developed by R. L. Polk (which prepares the City Directory) as well as available Internal Revenue Service data, and 1960 census information. In the field of employment projections, we intend to explore the applications of methodologies developed by the University of Colorado and Temple University under research grants from the Office of Manpower Policy, Evaluation, and Research. Findings of the Michigan State agency - Batelle Memorial Institute approach will be similarly evaluated. Financed by the Office of Manpower Policy, Evaluation and Research, we are also setting up a pilot program in Wisconsin aimed at developing a comprehensive system for collecting, analyzing and interpreting occupational information, including occupational labor supply and demand projections for implementing the Vocational Education Act and related manpower development needs. The pilot project will include an evaluation of current occupational analysis and occupational job market information tools. Finally, recognizing the valuable information available from employment service operations, we have initiated a quarterly survey of unfilled job openings, by occupation, area, and duration in nearly 80 local employment service offices. We intend to expand this reporting program to at least 150 areas in the near future. Analysis of these data will provide further insight into skill shortages as well as the differences between the requirements of available jobs and the capabilities of applicants seeking jobs.

Area Skill Surveys in Developing Economies

Research in occupational forecasting has also been conducted by the Department of Labor in cooperation with AID to devise an adaptation of the area skill survey procedure for use in developing countries.

With the development and application of the Area Skill Survey in the United States Employment Service technicians were called upon to apply the basic survey principle in many of the developing countries. As the survey process is flexible and since it does not rely on historical labor force data, it has been applied in such diverse areas as Iran, Liberia, Guyana, Ghana and Tanzania. Coverage varied from selected critical occupations and major employers in the country to comprehensive occupational studies and estimates representing all **nonagricultural** employment.

Because of mounting interest, the Agency for International Development called upon the Bureau to develop a technical handbook sufficiently comprehensive to provide manpower technicians working in the developing countries detailed guidance in applying the survey technique. The job was given to Mrs. Margaret Thal-Larson, formerly with the California Department of Employment of the Employment Security System. She utilized her long experience as a labor market analyst and drew on the experience of technicians who had applied the survey methodology abroad in developing the survey handbook.

After wide circulation for comment and suggestions among labor advisers and manpower technicians in developing countries, the handbook "Techniques for Determining Manpower Skill Needs and Training Requirements," was published and distributed by the Agency for International Development to its missions abroad and to ministries of labor and other manpower institutions throughout the world.

Experience has shown that modifications may be called for when the basic survey methodology is applied in another country. Because of differences in available manpower data, differences in institutional development, and differing objectives in utilizing the data to be collected, basic adaptations are often made.

For example, there have been cases where the survey has generated the first detailed manpower information available in the country. In these cases, there was no background data from which a preselection of critical occupations could be made. Establishment lists, which are the key to selecting the employer units to be called on, may not be available. The employer himself may not keep the sophisticated personnel or payroll records necessary to complete the **questionnaire**. Finally, institutions, such as an employment service or a manpower or statistical agency, or key tools, such as a system of occupational classification, are often not available to expedite the application of the skill survey technique.

Moreover, the developing country may have other objectives for the application of the information developed from the survey. Where the survey is the first industry-occupation inventory of a country, more comprehensive occupational coverage is required with the objective of identifying priorities as well as imbalances in the occupational structure. More comprehensive insight into the functioning of the labor market may be sought and, often, the factual basis for a continuing program of labor market information may be the survey objective.

Where an occupational classification system is not available for the country in question, the basis for a continuing program of job analysis is often a useful by-product.

One feature of the Area Skill Survey approach is its flexibility in meeting local conditions and objectives. Geographic, occupational, and industrial coverage may be universal or very limited, depending on local requirements, financial resources and the time available for collecting and processing data. When the survey technique was applied in Panama City, for example, it included nearly all nonagricultural wage and salary workers; all occupations were identified; and a sampling technique was used in the selection of reporting establishments. A similar survey conducted in Liberia, however, was limited to professional, technical, and clerical occupations in only 29 of the largest private establishments and government agencies.

The questionnaire can be simplified to reflect the level of employer record keeping and new questions may be added, such as information on foreign workers who may be scheduled for replacement by local citizens, on labor turnover, or on hiring channels. A study performed by the Di Tella Institute in Argentina did, in fact, include in its questionnaire such additional inquiries as the average work week, the length of time workers had been on the job, normal hiring channels, and salary levels by occupation, in addition to the usual inquiries made of employers.

Considerable interest in the developing country may center on the needs for raising the skill levels and productivity of currently employed workers in addition to seeking estimates of future needs. If this is the case, information on the training needs of persons presently employed and evaluations of the ways in which they acquired their training will be included. The questionnaire may even be designed to identify problem areas outside the field of manpower to enable government agencies to facilitate the industrial development of the private sector. Finally, consideration must be given to the entrance of new industries into the economy during the forecast period which may require provision for other skills not represented by present employers. This was done in Guyana, where occupational estimates, both direct and secondary, were derived from forecasted capital expenditures to be made by the government during the forecast period.

The Area Skill Survey, therefore, represents a flexible approach to the collection and forecasting of skill needs. Because it generates its own data, it can be applied in countries where the historic manpower data needed for trend analysis or benchmark surveys are not available.

By using individual establishment data, the occupational information obtained in the survey can be in greater detail than through forecasting techniques which usually develop only broad occupational groupings. In the Panama survey, all occupations were reported at the five-digit code level to permit the development of vocational training programs in the specific occupations where shortages were identified. In addition, the employer, because of his day-to-day contact with the problems of the local manpower market and his position within the business community, may be more realistic than a theoretical formula in his assessment of future manpower requirements and the institutional changes needed to better prepare manpower for its participation in industrial development.

Certain difficulties, however, must also be pointed out in applying the skill survey approach. First, the employer typically has only a short-run view of his manpower requirements. In developing countries, plant expansions, increased industrial activity, etc., are most frequently made on the basis of present day operations and economic conditions. Industrial activity ten or fifteen years in the future is quite often beyond the employers' forecastable horizon. Forecast periods of two or three years or, at a maximum, five years are the limits of the employers' ability to foresee his own activity. This limits consideration of occupations to those where the imbalances identified by the survey can be corrected within the forecast period--occupations requiring not more than two or three years of training or education. The skill survey, because it involves establishment contacts, is relatively more costly and time-consuming than forecast techniques performed by one or a small group of technicians utilizing existing data. The costs and time involved are a function, of course, of the geographic and industrial coverage of the survey and the complexity of the questionnaire. Part of this cost may be charged off to the training of staff, which might be the basis for an institution that would continue the work of manpower analysis and planning.

The results of a completed Area Skill Survey will provide a basis for making adjustments in the country's manpower training institutions to correct the existing and foreseeable imbalances between the supply and demand for specific occupational groupings. Some of the occupational information developed in the course of the survey can provide the basis for a wider program of job analysis and occupational classification, as well as prove useful in preparing vocational guidance and counseling materials.

The occupational-industrial composition patterns derived from the survey can be applied in estimating the specific occupational needs of future industrial expansion and to translate projected output goals in the more distant future into manpower requirements. Finally, such a survey may be the basis for establishing a continuing program of labor market information, providing benchmark occupational and industrial employment data for measuring the future changes in the manpower structure. An interesting example of this is the experience in Tanzania, where a skill survey of high-level manpower was performed in 1962 under the sponsorship of the Ford Foundation. This survey, which was in fact the initial source of detailed manpower information for the country, provided useful benchmark information for a more comprehensive manpower study completed last year.

The data originated by a survey will not be its only contribution. The survey "process" can bring together manpower institutions in the planning, effectuating and implementing phases of manpower programs leading to their increased future cooperation. Finally, the contact with employers may serve as an initial bridge in transmitting information and developing cooperation between government and private manpower development agencies and the industrial and business community which they serve.

AREA SKILL SURVEYS IN DEVELOPING COUNTRIES

Fletcher Wellemeyer

In applying the area skill survey in an emerging country, the manpower specialist performs two distinct functions:

1. He develops information for training and education and,

2. establishes a relationship between total human resource development and the development plan.

The survey can reveal the inter-workings of the economy and can be used to revise the development plan in the light of manpower shortages and surpluses.

Several problems present themselves, however,

1. a general lack of data,

2. a severe shortage of people who are familiar with survey techniques and who can carry on surveys after the advisory team leaves the country, and

3. a dearth of employers and government officials who are used to thinking in manpower terms.

Data problems can often be circumvented because of the inherent flexibility of the area skill survey approach. A local census may provide basic data, while employers most often can indicate basic employment information, labor shortages and surpluses, turnover, present training patterns and educational requirements. It is often suggested that less data are available for long-run projections, especially where there is a development plan. Where there is a plan, it is thought that employers depend too heavily upon national projections, assuming the objectives of the plan will be met. What evidence is available has not yet confirmed this hypothesis.

Many countries use the ILO classification system, but this has its limitations as it concentrates heavily on industrial and not occupational classifications.

Question from the floor

It has been suggested that employers are unable to accurately forecast beyond six months. Have you any information which indicates how well the two and five year projections are holding up? Have you any data from the York Survey?

Comment by Mr. Chavrid

As you know, employer forecasts are partially based on assumptions provided by the Bureau of Employment Security. In the York survey we asked employers to assume a continuation of the Korean War. The results, of course, did not stand up very well. In other areas where there has been post-survey verification, the results are more encouraging.

Comment by Mr. Wellemeyer

Post-survey analyses have been made of Trenton, New Jersey and Battlecreek, Michigan. Trenton was analyzed after two years and Battlecreek after five. The accuracy of the forecasts was heartening. In Trenton, actual employment was 100.9 percent of what was forecasted and in Battlecreek, 103 percent. Moreover, occupational forecasts were generally quite accurate, especially those occupations denoted as "important." In very few cases would training have been a mistake.

Question from the floor

Are health, education and general government services included in area skill surveys? Can you provide any information on the accuracy of forecasts in these areas?

Comment by Mr. Chavrid

All important occupations are usually included in area surveys and these include government, education and health services unless the survey is specifically designed to serve other purposes.

A definite answer cannot be given as to the accuracy of forecasts since few data are available. What data are available are encouraging. In general, schools are quite accurate in their forecasts (they have census data to go by) while medical manpower requirements are often understated.

Question from the floor

Are the difficulties in surveying employers in the developing countries the same in the nationalized or public as in the private sector? It would seem that the existence of a national plan would make more precise forecasts possible.

Comment by Mr. Wellemeyer

There has been great improvement in "public" sector forecasts in recent years, especially as historical employment data have been collected. It is difficult to make generalizations, however, and there are often mitigating circumstances. Former colonies, for example, may be too dependent upon previous industrial organization with resulting bias in estimates.

Comment by Mr. Chavrid

The results obtained depend upon the purpose of the survey and the assumptions upon which it is based. The difficulty lies in the fact that unless provided certain assumptions, employers often attempt to consider supply factors as well as demand. If they do forecast supply, and base their demand estimates upon this forecast there will be no problem. The apparent lack of any demand and supply imbalance means no action will be taken. This is one reason why assumptions are provided the employer, especially the assumption that all necessary manpower will be available.

Question from the floor

What have been the results of area skill forecasts in agriculture?

Comment by Mr. Chavrid

Very little forecasting has been attempted in the field to date. However, plans to survey on a state-wide basis will bring this problem to the fore.

PART VII: COMMENTARIES ON THE APPLICATION OF FORECASTING TECHNIQUES TO DEVELOPING COUNTRIES

Joshua M. Levine

Sitting at what is essetnially an operating desk, confronted by dozens of conflicting program requests for attention and for funds, it is essentially to establish a manpower policy or philosophy as a means for assessing competing claims. In my attempts in the last few years to formulate a sort of "manpower philosophy," the best I have been able to come up with is a rather simple definition of manpower as the preparation, distribution, and the utilization of people in and around the work place. In view of this definition, the terms of the symposium topic may be stated as a question: What are the tasks which manpower estimating can perform in the preparation, utilization, and allocation of manpower? I think that the relationship is closest in the first, that is, the preparation of manpower. It is not really relevant to our central symposium topic to suggest that there is much more to be gained by manpower technicians in the development process by concentrating on the role of manpower functions in the second two areas, i.e., in the allocation and utilization of manpower, than there is in the first. Partially, this is because the preparation step lies to some extent outside the field of manpower and in the area of education.

Accepting this assumption that the primary uses for manpower forecasting techniques lie in the area of preparation of manpower, and looking to see what use we can make of the manpower estimates in the decision-making process, it seems to me that a rather natural dichotomy appears: there are the development problems of today and there are those that will present themselves in the future. It is perhaps an oversimplified solution to these problems, but one in which I believe, to say that for today's problems, you need today's answers so that forecasting techniques are of relatively little value when applied in this area (i.e., currently). These can be best handled by an approach similar to the Area Skill Survey technique.

In relation to future problems, I would confine the uses of long-range manpower estimates to the design of educational systems. The question then becomes, "What decisions need be made today related to the future of our education system some ten or fifteen years in the future?" In those terms, the answers which we seek from manpower estimating are rather gross answers, not refined answers. (In fact, it has already been suggested in this symposium that the techniques often used in making the long-term forecasts can be subject to wide variances in the final outcome due to only small changes in the initial assumptions.)

We need to know as a practical matter, for example, whether Colombia will need to prepare facilities in its University in such fields as business administration, economics, engineering, etc. And very grossly, whether there should be a greater or smaller investment in business administration rather than in the school of engineering. The question is not whether it will be 100 or 300 chemical engineers in 1975 but instead whether it is worthwhile establishing a school of chemical engineering in a Colombian university.

This decision in itself will take some five years to implement. At the end of those five years, we will know more about the accuracy of our ultimate need for chemical engineers ten or fifteen years hence than we do now, and our capacity to adjust to that more accurately stated need will be immeasurably greater.

In my view, unless it can be demonstrated that there are more immediate uses in the decision-making process for long-term manpower forecasting than the decision making which goes into the designing of higher education institutions, then we really have overdone the long-term manpower estimating business. We ought instead to get on to the uses of manpower information in the other two areas which I have suggested: in the allocation and utilization aspects.

Burnie Merson

My feeling is that there has been an over-emphasis in terms of resources, time, and talent on long-range manpower forecasting at the expense of more immediate problems of job development and reduction of structural unemployment through such measures as occupational training and matching of men and jobs. Moreover, we should devote more attention to increasing current productivity through better manpower utilization. It is equally important to try to make estimates of levels of employment and unemployment and their characteristics, to measure productivity, and to study current manpower bottlenecks impeding achievement of development goals. We should, in fact, be investigating the causes of social unrest and the low standards of living in the less-developed countries. Projecting occupational requirements of, say, 10 to 15 years and worrying about the future labor force can be excuses for not considering the pressing problems related to the current labor force.

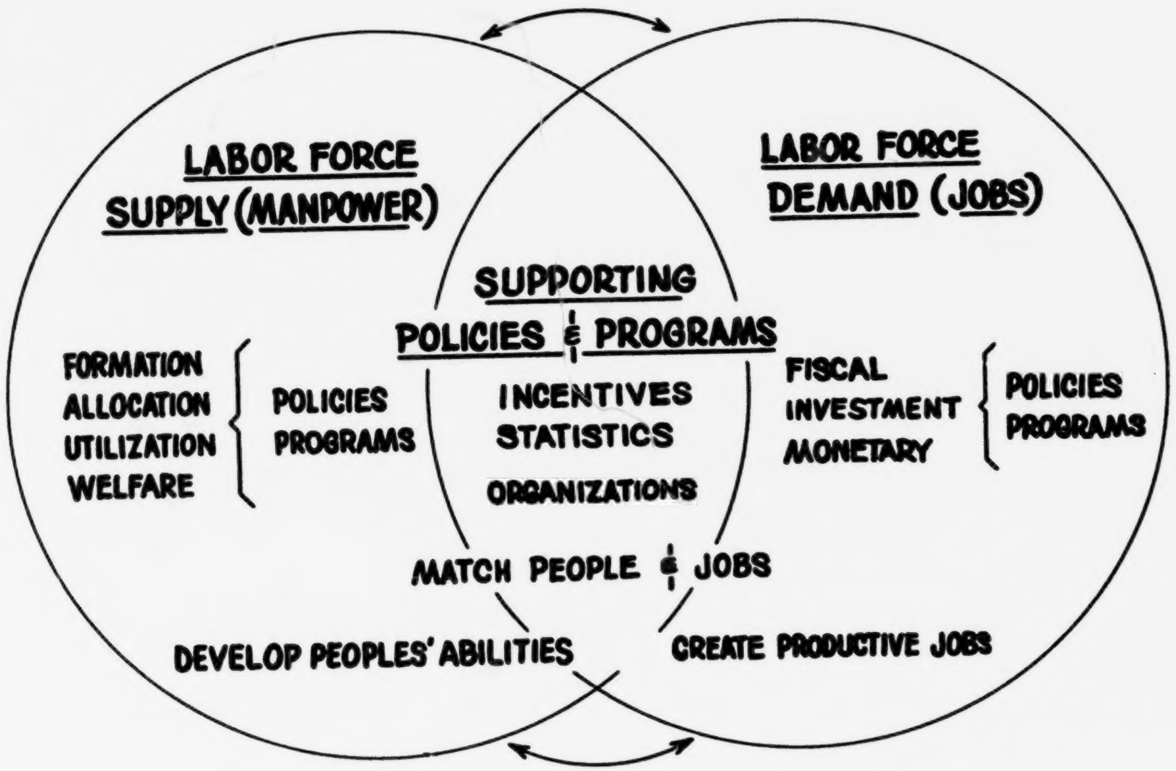
I was pleased to see Dr. Harbison's presentation of the "Systems Approach" indicating that manpower forecasting is in fact only a small portion of a much larger area of concern. I would go even further in minimizing the importance of manpower forecasting. The real key to improving conditions in the developing countries is an active employment and manpower policy for full, productive, freely chosen employment, which can provide the framework or "System" for integrating the various approaches presented here with the larger and more immediate considerations I have mentioned.

My own suggestion is that on the supply side which I call manpower, you really have the elements of formation, allocation, utilization and welfare of the labor force. As to the formation element, education, of course is the primary pre-employment basis for middle and high level human capital. So is good health. Given an acceptable level of health and education, I cannot see the necessity to develop detailed occupational-education linkages. There are thousands of occupations in a developing country and, really, the most important thing is an acceptable minimum level of education for fields of occupations. Most of the skill training in specific occupations comes from on-the-job experience and training plus self-study, rather than from formal education.

In addition, a developing economy based on improvements in technology means a changing occupational structure. A worker may have to relearn or change his occupation several times in his lifetime calling for continuing learning on his part. Moreover, proper allocation and utilization of manpower will greatly outweigh the contributions to overall development of any amount of manpower forecasting. Welfare provisions prolonging the working life, increasing the productivity of workers, improving working conditions and labor-management relations, and fair wages may far outweigh benefits from, let us say, changes in training programs. Finally, manpower planners must actively cooperate with fiscal, monetary, and investment officials as well as integrate development planning with manpower and employment policies so that employment expansion can keep pace with labor force growth and worker displacements arising from higher productivity.

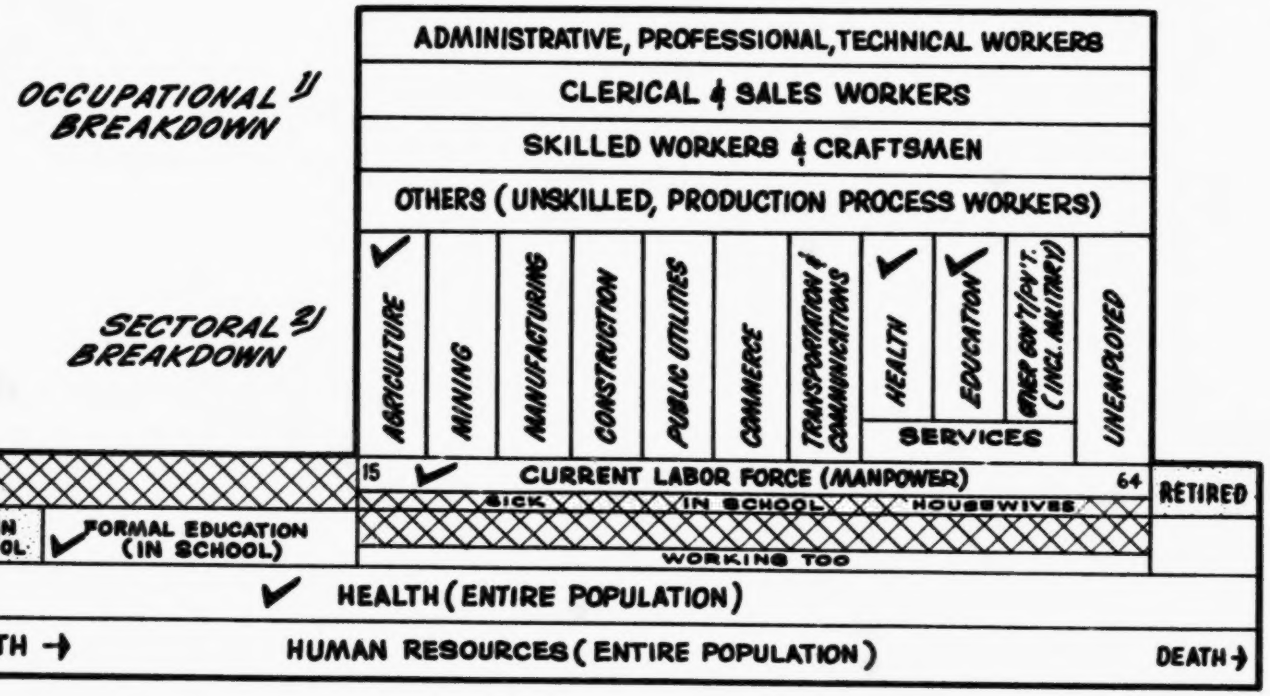
My major point is related to the relative contribution to the development of a country of investing resources in projecting manpower requirements some 15 years in the future and investing in studying the more immediate problems of labor-management relations, unemployment, underemployment, applicability of self-help projects, incentives, and so forth. I think it is evident that there are many areas which take precedence over manpower forecasting which will offer much greater returns in solving the problems which we are facing today in the developing countries. I would hope that universities would also work with AID in developing research centers which concentrate on problems and solutions relating to current labor force development, job creation, linking men and jobs, and man-hour productivity.

ELEMENTS OF ACTIVE MANPOWER AND EMPLOYMENT POLICIES FOR ACHIEVEMENT OF COUNTRY DEVELOPMENT GOALS


LABOR FORCE SUPPLY (MANPOWER)
FORMATION
ALLOCATION
UTILIZATION
WELFARE
POLICIES
PROGRAMS
SUPPORTING POLICIES & PROGRAMS
INCENTIVES
STATISTICS
ORGANIZATIONS
LABOR FORCE DEMAND (JOBS)
FISCAL
INVESTMENT
MONETARY
POLICIES
PROGRAMS
MATCH PEOPLE & JOBS
DEVELOP PEOPLES' ABILITIES
CREATE PRODUCTIVE JOBS

MERSON
April 1966

MANPOWER/EMPLOYMENT and {HEALTH EDUCATION AGRICULTURE


ADMINISTRATIVE, PROFESSIONAL, TECHNICAL WORKERS
OCCUPATIONAL BREAKDOWN [1]
CLERICAL & SALES WORKERS
SKILLED WORKERS & CRAFTSMEN
OTHERS (UNSKILLED, PRODUCTION PROCESS WORKERS)
SECTORAL BREAKDOWN [2]
✓
AGRICULTURE
MINING
MANUFACTURING
CONSTRUCTION
PUBLIC UTILITIES
COMMERCE
TRANSPORTATION & COMMUNICATIONS
✓
HEALTH
✓
EDUCATION
OTHER GOV'T/PV'T. (INCL. MILITARY)
SERVICES
UNEMPLOYED
15
✓
CURRENT LABOR FORCE (MANPOWER)
64
RETIRED
SICK
IN SCHOOL
HOUSEWIVES
NOT IN SCHOOL
✓
FORMAL EDUCATION (IN SCHOOL)
WORKING TOO
✓
HEALTH (ENTIRE POPULATION)
BIRTH →
HUMAN RESOURCES (ENTIRE POPULATION)
DEATH →

---

[1] MEMBERS OF THE LABOR FORCE HAVE OCCUPATIONAL SKILLS.
[2] MEMBERS OF THE LABOR FORCE PRODUCE GOODS AND SERVICES.

MERSON
April 1966

Robert L. Clark

I am disturbed by the lack of a sense of urgency in the field of economic development today. There is not time to do all the things we would like to do. The developing countries are not going to develop in the same evolutionary way we developed in the United States. Mass communications are such that we are constantly aware of events and problems in all parts of the world. The people in developing countries are also exposed to these mass communication media, making them aware of us, our activities, and our level of living. A whole undercurrent of movement for change and a desire for action has been created which has not been reflected among the students of economic development, and the technicians and theoreticians in the field.

I am also disturbed by the emphasis which has been placed on education as, perhaps, the only means of raising the level of living in the developing countries. It is important and vital. Efforts, of course, should be continued in this area, but not the overriding efforts of the past. Education will not by itself insure capable, imaginative participation in the labor force as we have seen so many times.

Now, I should like to turn to the "Systems Analysis Approach" suggested earlier by Dr. Harbison. I should like, however, to suggest the following continuum as a basis for obtaining perspective in this area:

1) First, as a basis for dealing with the development of any nation, we must know the objectives and the national goals of that nation. What kind of nation is it that they are trying to create in terms of their economic, social, and political objectives?

2) Next, we must determine all of the interrelationships that are involved--Systems Analysis, if you will--in pulling together the resources in reaching these goals. This includes such things as economic growth, social and political stability, and the utilization of the natural and other resources of the nation in the achievement of these objectives.

3) Once the above is determined, then it must be decided as to what manpower and employment factors are revealed in this analysis. Out of these factors must be built a manpower and employment strategy--an affirmative manpower policy.

4) Finally, the specific programs must be determined which will implement the strategy.

The above framework is somewhat more inclusive than that suggested by Dr. Harbison as it considers broader economic and social questions than those related only to manpower policies.

This brings us back to the question of manpower forecasting which will be employed within the above framework in both steps two and three for two reasons: 1) when you are developing your strategy, you must have forecasts so that you can decide where to direct efforts, and 2) you also need forecasts to determine what kind of resources you will have or what problem areas you will have.

When we are discussing the forecasting of requirements, we must define what we mean by requirements. Manpower has two facets: the manning of economic and social activities, and income-producing employment per se. Are we forecasting our requirements for manpower to staff industry and other economic activities, or are we forecasting the economic situation to ascertain what the rate of employment or unemployment might be in order to determine what action we should take to achieve a satisfactory level of employment?

Meredith Givens

We have been exposed to a broad range of alternative approaches to the forecasting of manpower requirements. I should like to introduce some comments based on experience I have had in developing countries which may be relevant to this topic. First, let me mention my experience in Pakistan where I was associated with the Planning Commission. Regardless of how futile we think central planning may often be, Pakistan was an exception and the provisions of the Second Plan have been largely fulfilled. The national planning efforts, which are focused on the acceleration of development, are directed to both growth and welfare. Accepting this, I think it is obvious that employment goals or targets are an implicit part of the planning process. How are these determined? First, an investigation is made of the population and how it is changing. Second, an attempt is made to project the size and distribution of the labor force. Consideration should be given to the potential labor force so as to determine the outer limits of the labor factor. Third, we must determine to what extent the labor force is employed, and how many are unemployed or underemployed. This, then, gives us an indication of what we start out with in planning for manpower utilization. The development plan will then define goals. There are various goals related to production, to the balance of payments, and so forth. The important thing is that each of these goals will help to determine how many people will be employed. There will be an effort to employ as many people as possible through a judicious use of the resources available to the country. A "forecast" then becomes an estimate of what it is we shall try to do. We do not in fact try to predict what is going to happen, but we in fact outline what we hope to do or hope will happen. We employ the more elaborate forecasting techniques, therefore, to give us insight into how we go about the business of attaining these goals.

In Pakistan, while fairly good population data exist, there is insufficient information on employment and unemployment. The Planning Commission had very poor information--in fact, hardly any--with which to estimate the specific needs of individual schemes and projects which were being introduced into the domestic economy. In spite of this, the Second Plan was a success. Despite the poor tools available and the neglect of specific detailed planning for manpower, the manpower necessary to carry out the programs envisaged in the plan was found in some form or another.

Let me turn now to the Philippines. Here I was called upon to evaluate their labor statistics program back in the mid-Fifties. I found a general "anemia" in this area. In the years which have elapsed since this time, the Philippines in fact have built up what I believe are the best usable statistics you will find anywhere in Asia. They have a quarterly household survey and a current employment statistics program, and current data are geared into the periodic census data. I do not know to what extent these data have been utilized in manpower planning, but a substantial amount of basic data are currently available.

In conclusion, let me suggest that:

1) Most developing countries have inadequate statistical resources, and very little in the area of educational statistics. This makes the job of planning for employment very difficult.

2) One of the key factors in projecting into the future, and measuring progress along the way, is the establishment of a continuing statistical program to provide current data to meet practical needs.

SUMMARY AND CONCLUSIONS

Edgar C. McVoy

Approaches to forecasting, projecting, or estimating manpower requirements vary according to the purpose, the degree of economic planning, the availability and reliability of data, and other factors. There is no one superior technique for such forecasting for developing countries. One or more of several complementary approaches can be applied. Among these are the following:

A. Long-range projections, for educational planning, especially technical and professional education, and for other programs requiring long lead times, such as the planning and establishment of a national apprenticeship scheme.

The usual steps are:

1. Project economic changes, or growth.

   Such projections differ according to whether there are well-defined targets for GNP, production, and so forth, or whether the economy is largely a market economy without much central planning. Three elements in economic change need different treatment: (a) expansion; (b) changes in technology; (c) establishment of new industries or activities.

2. Forecast changes in the economy by sector--industry, agriculture, trade, services.

   For this purpose various approaches are used. The manpower forecasters may merely take these data from a country's economic development plan, if there is one. Or the data may be developed by the forecasters, using such techniques as estimates of final demand and input-output analysis.

3. Relate future manpower requirements to projected economic changes.

   The most common approach is to estimate future changes in labor productivity, which in manufacturing and related activities are calculated in terms of value added per unit of labor input. Alternatives which have been suggested are capital invested per unit of labor input, and employment patterns designed to reach established output targets at lowest cost.

4. Determine requirements by occupation.

Manpower requirements by economic sector and subsector are projected, either in connection with the analysis described above, or subsequent to this process, by occupational or functional groupings. These groupings usually are in broad categories, in the range of nine to twelve groups. A few countries have worked with a larger number, particularly to give additional detail in the professional and technical categories.

B. International comparison of industry/occupational structure

International comparisons have been used in various forms and have been the subject of systematic analysis during the past three years under a project at Northeastern University. The hypothesis tested in that project is that occupational structure bears a close relationship to labor productivity. In the Northeastern University studies, data from 20 countries were analyzed with respect to 58 industries and some 200 occupations. Tabulations show the proportion of employees in specified occupational groups against indices of labor productivity. Findings suggest that a developing country can choose a given level of productivity for a certain industry as a goal, then select a country with this level of productivity and use its occupational pattern for the industry concerned as a pattern for its own manpower development.

C. Area skill survey and labor area demand analysis

This approach is for relatively short-range forecasting of manpower requirements and is usually related to specific recruitment or training programs. The basic technique is an establishment survey which seeks information from employers on present vacancies and future demand in certain occupations. In the United States, the technique has been refined and extended, in recent years, to provide more data on occupational content and to relate local production estimates to general economic trends. Both replacement and expansion requirements are included in this type of forecast.

The relation of manpower supply to demand was emphasized in connection with some of the approaches described above, in two main respects: (1) demand and supply tend to be identical in the sense that an estimate of future employment can represent, in a large measure, both demand and supply of manpower; (2) a realistic forecast of demand must take into account supply factors, as well as related elements of wages, incentives, occupational shifting, and mobility of labor. "Pure demand" often is modified or diluted in response to or anticipation of these factors.

It was pointed out also that, in the United States at least, the replacement factor is far more quantitatively significant than the expansion factor in generating manpower requirements, and that this factor has been given less systematic study than expansion.

Some of the weaknesses and problems in manpower forecasting approaches brought out in the symposium are the following:

1. Lack of relevant data or inaccuracy or unsuitability of data available.

2. The "substitution" factor, i.e., substitution of one type of manpower for another. For example, a small number of skilled workers may be substituted for a large number of unskilled workers or technicians may be substituted for professionals. Such substitutions can create significant miscalculations of manpower requirements when they are projected on the basis of occupational patterns assumed to be "standard" for a given industry.

3. The relationship between educational level and specialization and actual employment in a given occupation can vary widely. In practice, there are numerous persons in many occupations who do not have the amount or kind of education frequently associated with the occupation or thought to be necessary. An arbitrary assumption in this matter is likely to result in the projection of inflated educational requirements.

4. Many persons do not work in the occupation for which they are trained.

5. In international comparisons of labor productivity, exchange rates used in estimating value added can distort the true picture.

6. The quantitative techniques described are difficult to apply to certain occupations, e.g., entrepreneurs, managers, political leaders, artists, writers, farmers.

7. The distinctions among foremen, skilled, semiskilled and unskilled workers are often not clearly delineated. The occupational code used in many countries may describe the industry in which an employee is engaged rather than the type of work performed.

8. With regard to economic activities, estimates of manpower requirements by the methods described above are difficult for small-scale agriculture, trade, and other activities which are not carried out in medium to large-scale establishments with specialized occupations and measurable inputs and outputs.

It was noted that while these difficulties complicate the task of manpower forecasting, most difficulties can be overcome, or their effect can be held to an acceptable minimum, by the skill and good judgment of the manpower specialist.

There was general agreement that the techniques described above are complementary, not competing systems, and that each has a legitimate use in both developed and developing countries.

SYMPOSIUM LEADERS, DISCUSSANTS, AND CHAIRMEN

Frederick H. Harbison
Industrial Relations Section
Department of Economics
Princeton University

Morris A. Horowitz
Chairman, Department of Economics
Northeastern University

Herbert S. Parnes
Department of Economics
Ohio State University

Vladimir D. Chavrid
Director, Office of Manpower Analysis and Utilization
United States Employment Service
Bureau of Employment Security
U. S. Department of Labor

Harold Goldstein
Assistant Commissioner for Manpower and Employment Statistics
Bureau of Labor Statistics
U. S. Department of Labor

Manuel Zymelman
Department of Economics
Northeastern University

Irwin L. Herrnstadt
Department of Economics
Northeastern University

Russell Davis
School of Education
Harvard University

Jack Alterman
Director of Economic Growth Studies
Bureau of Labor Statistics
U. S. Department of Labor

Sol Swerdloff
Chief, Division of Manpower and Occupational
Outlook
Bureau of Labor Statistics
U. S. Department of Labor

Robert L. Clark
Consultant on Manpower and Employment
Ford Foundation

Meredith B. Givens
Director of Manpower and Human Resources
Office of Technical Cooperation and Research
Agency for International Development

Robinson Hollister
Economist, Office of Economic Opportunity

Joshua Levine
Manpower Advisor
Bureau for Latin America
Agency for International Development

Burnie Merson
Chief, Planning and Evaluation Division
Office of Labor Affairs
Agency for International Development

John F. Hilliard
Deputy Director for Latin America
Ford Foundation

John P. Walsh
Assistant Manpower Administrator
U. S. Department of Labor

Ealton L. Nelson
Manpower Advisor
Office of Labor Affairs
Agency for International Development

Kenneth V. Pankhurst
Department of Citizenship and
Immigration (Manpower)
Ottawa, Canada

J. Fletcher Wellemeyer
Consultant
Washington, D. C.

PARTICIPANTS

Wayne G. Althaus
Chief, Manpower Resources
Office of Emergency Planning
Executive Office Building Annex
Washington, D. C.

Robert Bretzfelder
Economist
Office of Manpower Policy,
Evaluation and Research
U. S. Department of Labor
Washington, D. C.

King Carr
Deputy Assistant Secretary for
Policy Planning and Research
U. S. Department of Labor
Washington, D. C.

S. H. Chafkin
Director, Office of Planning
Peace Corps
806 Connecticut Avenue, N. W.
Washington, D. C.

David Christian
Assistant Manpower Administrator
Manpower Administration
U. S. Department of Labor
Washington, D. C.

Sanford Cohen
Faculty Chairman
International Manpower Institute
U. S. Department of Labor
Washington, D. C.

Daniel Darling
Director, Office of Program Reports
Bureau of Employment Security
U. S. Department of Labor
Washington, D. C.

Kenneth Deavers
Senior Associate
Planning Research Corporation
1875 Connecticut Avenue, N. W.
Washington, D. C.

Miss Nora E. Dollymore
Economist
Office of Business Economics
U. S. Department of Commerce
Washington, D. C.

Rolf H. Dumke
Student Aide
Agency for International Development
Washington, D. C.

Lewis H. Earl
Chief, Foreign Manpower Activities Staff
Office of Manpower Policy, Evaluation
and Research
U. S. Department of Labor
Washington, D. C.

Miss Betti C. Goldwasser
Chief, Cost-Benefit Analysis Staff
Office of Manpower Policy, Evaluation
and Research
U. S. Department of Labor
Washington, D. C.

Sidney A. Jaffe
Deputy Director
Office of Economic and Manpower Studies
National Science Foundation
Washington, D. C.

Mrs. Ruth R. Johnson
Public Health Analyst
Public Health Service
Room 2A-04, Building 31
Bethesda, Maryland

Mrs. Evelyn R. Kay
Economist, Office of Foreign Labor and Trade
Bureau of Labor Statistics
U. S. Department of Labor
Washington, D. C.

Eugene C. Martinson
Labor Economist
Agency for International Development
Washington, D. C.

Harry A. Moss, Jr.
Apprenticeship and Training Representative
Bureau of International Labor Affairs
U. S. Department of Labor
Washington, D. C.

Mrs. Philomena Mullady
Labor Economist
Office of Manpower Policy, Evaluation and Research
U. S. Department of Labor
Washington, D. C.

John T. Murray
Chief, Office of International Activities
Bureau of Employment Security
U. S. Department of Labor
Washington, D. C.

Herbert H. Rosenberg
Chief, Resources Analysis Branch
Room 1B-44, Building 31
National Institutes of Health
Bethesda, Maryland

William C. Shelton
Chief, Division of Foreign Labor Conditions
Bureau of Labor Statistics
U. S. Department of Labor
Washington, D. C.

Howard V. Stambler
Special Assistant to the Commissioner of Labor Statistics
Bureau of Labor Statistics
U. S. Department of Labor
Washington, D. C.

GPO 918-795